Agri 2022;34(3):187–192
doi: 10.14744/agri.2021.98048

ORIGINAL ARTICLE

Results of ultrasound-guided interfascial block of the trapezius muscle for myofascial pain

Miyofasiyal ağrıda ultrason eşliğinde yapılan trapezius kası interfasiyal bloku sonuçlarımız

Tülin ARICI,[1] İdris Şevki KÖKEN[2]

Summary

Objectives: Myofascial pain syndrome (MPS) is a regional pain syndrome that causes pain due to hyperirritable trigger points in the musculoskeletal system. Trapezius is one of the most commonly affected muscles in MPS. We aimed to evaluate the efficacy of an ultrasound-guided interfascial block of the trapezius muscle in patients with MPS.

Methods: The records of patients who underwent an ultrasound-guided interfascial block of the trapezius between November 2019 and October 2020 were retrospectively examined. The pain levels of the patients were evaluated with the numeric rating scale (NRS). Patients with a reduction in pain ≥50% after the procedure were considered to have benefited from the procedure.

Results: A total of 54 patients (41 women and 13 men) were evaluated. The mean NRS values of the patients were 7.16 (5–9) before the procedure, 3.31 (0–8) 10 min after the procedure, and 3.37 (0–8) 1 week after the procedure. The number of patients who benefited from the procedure was 40 (74.07%) 10 min after the procedure. The number of patients who benefited from the procedure for up to 1 week, 1–2 weeks, 2 weeks–1 month, 1–3 months, and more than 3 months after the procedure was 38 (70.37%), 36 (66.66%), 31 (57.40%), 26 (48.14%), and 17 (31.48%), respectively.

Conclusion: Pain relief lasting for months was achieved in most of the patients. We believe that ultrasound-guided interfascial block of the trapezius is effective for the treatment of MPS.

Keywords: Interfascial block; myofascial pain; trapezius muscle.

Özet

Amaç: Miyofasiyal ağrı sendromu, kas iskelet sisteminde hiperirritabıl noktalardan kaynaklanan ağrıya neden olan bölgesel bir ağrı sendromudur. Miyofasiyal ağrı sendromu kronik ağrının en sık sebebidir ve trapezius kası en sık etkilenen kaslardan biridir. Bu çalışmada, trapezius kasındaki tetik noktaya bağlı miyofasiyal ağrı sendromu olan hastalara uyguladığımız ultrason eşliğinde trapezius kası interfasiyal blokunun etkinliğinin geriye dönük olarak değerlendirilmesi amaçlandı.

Gereç ve Yöntem: Bu çalışmada, retrospektif olarak algoloji polikliniğinde Kasım 2019-Ekim 2020 tarihleri arasında miyofasiyal ağrı nedeniyle ultrason eşliğinde trapezius kası interfasiyal bloku uygulanan hastaların dosyaları incelendi. Hastaların işlem öncesi ve işlem sonrası ağrı düzeyleri Numerik Rating Skala ile değerlendirildi. İşlemden sonra ağrıda %50 ve daha fazla oranda azalma olan hastaların işlemden faydalandığı kabul edildi.

Bulgular: Çalışmada, miyofasiyal ağrı nedeniyle ultrason eşliğinde trapezius kası interfasiyal bloku uygulanan 41'i kadın, 13'ü erkek toplam 54 hasta değerlendirildi. Hastaların işlem öncesi ortalama Numerik Rating Skala değerleri 7,16 (5–9) iken, işlemden 10 dakika sonra 3,31 (0–8) ve işlemden bir hafta sonra 3,37 (0–8) idi. İşlemden faydalanan hasta sayısı işlemden 10 dakika sonra 40 (%74,07) idi. İşlem sonrası bir haftaya kadar faydalanan hasta sayısı 38 (%70,37), 1–2 hafta arasında faydalanan hasta sayısı 36 (%66,66), 2 hafta-1 ay arasında faydalanan hasta sayısı 31 (%57,40), 1–3 ay arasında faydalanan hasta sayısı 26 (%48,14) ve 3 aydan daha uzun süre faydalanan hasta sayısı ise 17 (%31,48) olarak bulundu.

Sonuç: Çalışmamızda hastaların çoğunda aylar süren bir ağrı rahatlaması elde ettik. Ultrason eşliğinde yapılan trapezius kası interfasiyal blokunun miyofasiyal ağrı sendromu tedavisinde etkili olabileceği kanaatindeyiz.

Anahtar sözcükler: İnterfasiyal blok; miyofasiyal ağrı; trapezius kası.

[1]Department of Anaesthesiology and Reanimation, Pain Clinic, University of Health Sciences Samsun Training and Research Hospital, Samsun, Türkiye
[2]Department of Neurology, Pain Clinic, Balıkesir Atatürk City Hospital, Balıkesir, Türkiye

Submitted *(Başvuru tarihi)* **14.01.2021 Accepted after revision** *(Düzeltme sonrası kabul tarihi)* **16.09.2021 Available online date** *(Online yayımlanma tarihi)* **01.07.2022**

Correspondence: Dr. Tülin Arıcı. Sağlık Bilimleri Üniversitesi Samsun Eğitim ve Araştırma Hastanesi, Anesteziyoloji ve Reanimasyon Anabilim Salı, Algoloji Kliniği, Samsun, Türkiye.
Phone: +90 - 532 - 826 73 10 **e-mail:** arici-tulin@hotmail.com

Introduction

Myofascial pain syndrome (MPS) is a regional pain syndrome that causes local or referred pain due to hyperirritable trigger points that are localized within taut bands in the musculoskeletal system.[1–3] MPS is the most common cause of chronic pain[4,5] and occurs at a rate of approximately 30% in primary care clinics[6] and 85–93% in pain clinics.[5,7] The syndrome primarily affects adults and is mainly seen in women.[6,8]

The trapezius is one of the most commonly affected muscles in MPS,[9] and approximately 85% of patients with MPS have trigger points in the upper part of this muscle.[10] Trigger points can be active or latent. Active trigger points cause spontaneous pain and motor symptoms with nerve stimulation, while latent points do not cause painful symptoms. Biochemical mediators such as bradykinin and serotonin are also present at active trigger points.[11]

Pharmacological agents, manual therapy, physical therapy, stretching exercises, dry needling, trigger point injections, intramuscular electrical stimulation, and botulinum toxin injections are used for the treatment of trigger points.[12,13] Recently, interfascial injections are widely used to reduce myofascial pain.[14–17] The fascia consists of undifferentiated mesenchymal tissues surrounding specific organs and tissues or forming a filler between tissues and organs. The muscle fascia has many functions in addition to protecting the muscle and forming an osteofascial compartment for the muscle. It can coordinate muscular activity and acts as a large proprioceptive organ.[18] In addition, it plays a role in the etiopathogenesis of several extra-articular pain syndromes.[19]

In this study, we aimed to retrospectively evaluate the efficacy of an ultrasound-guided interfascial block of the trapezius muscle in patients with MPS associated with a trigger point in this muscle.

Material and Methods

In this study, the records of patients who underwent an ultrasound-guided interfascial block of the trapezius due to myofascial pain between November 2019 and October 2020 in the algology outpatient clinic were retrospectively examined. After obtaining the approval of the ethics committee (December 9, 2020, GOKA/2020/16/5), patients with an active trigger point in the trapezius (a painful palpable nodule in the muscle, referred pain, pain on palpation of the trigger point, and limitation of movement in the affected muscle) who were unresponsive to medical and physical therapy and had a history of pain for at least 3 months with a normal neurological examination were included in the study. Exclusion criteria included previous cervical surgery; other causes of pain such as radiculopathy, cervical disk hernia or entrapment neuropathy; history of malignancy; coagulopathy or anticoagulant use; pregnancy; inflammatory, infectious, or autoimmune disease; and any interventional pain treatment within the past 3 months.

All procedures were performed with non-invasive arterial blood pressure, peripheral oxygen saturation, and electrocardiography monitoring in the operating room. The intravenous path was opened. The patients were placed in the prone position and their skin was wiped with povidone-iodide. They were then covered with a sterile drape, and the procedures were performed using a linear probe (6–13 MHz) guided by Logiq P5 ultrasound (Avante Health Solutions, Concord, North Carolina, United States). The trapezius was visualized, and a 25-gauge spinal needle was advanced in plane close to the trigger point, to the interfascial space between either the trapezius and supraspinatus muscles (Fig. 1), trapezius and levator scapulae muscles (Fig. 2), or trapezius and rhomboideus major muscles (Fig. 3).

The needle tip was delivered to the hyperechoic line formed by the fascia of the trapezius muscle and the fascia of the underlying muscle. Subsequently, 2 ml of saline was administered and an anechoic enlargement was obtained by hydrodissection. The tip of the needle was confirmed to be between the fascia of the two muscles. The needle position was readjusted, and the interfascial space was accessed among patients in whom an appropriate image could not be obtained. After the injection site was confirmed by an appropriate spread of the physiological saline solution, the needle was removed from the syringe and attached to a 10 cc 0.125% bupivacaine filled syringe. The injection was completed in approximately 1 min. At the end of the procedure, the needle was removed and the skin was covered with a sterile tape. For cases of bilateral involvement, the procedure was performed bilaterally and a total

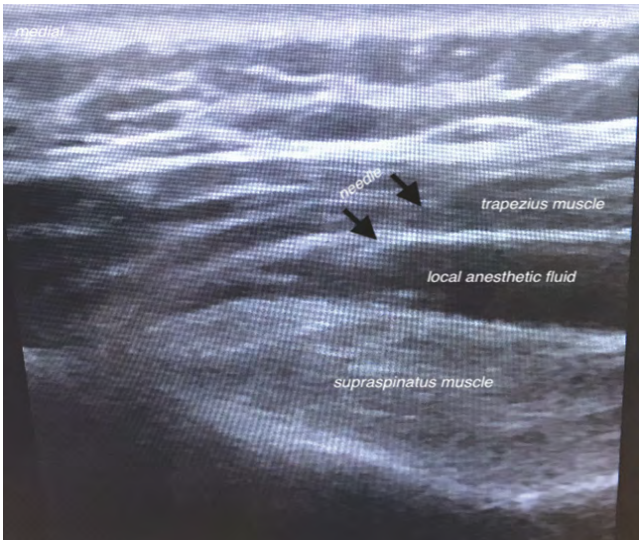

Figure 1. Injection between trapezius muscle and supraspinatus muscle.

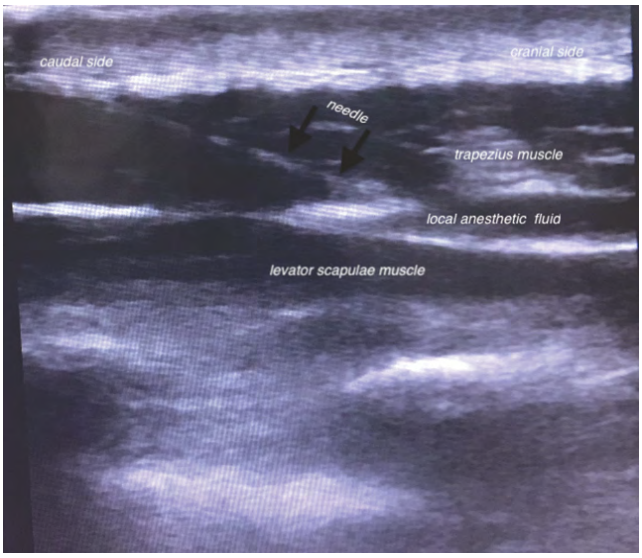

Figure 2. Injection between trapezius muscle and levator scapulae muscle.

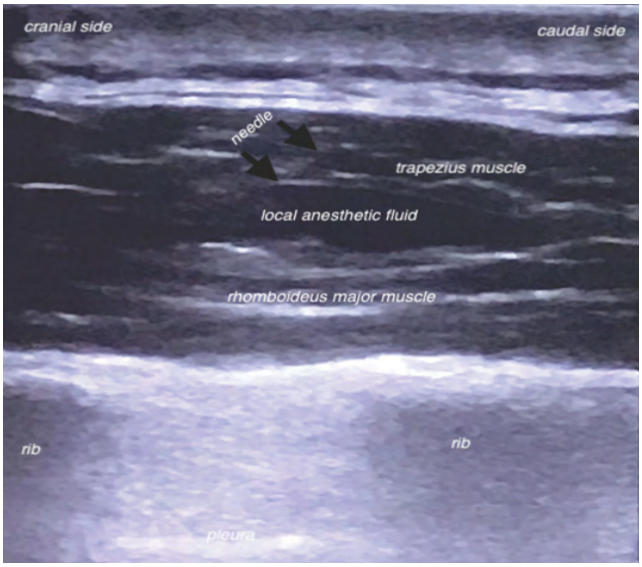

Figure 3. Injection between trapezius muscle and rhomboideus major muscle.

of 20 cc injection was administered with 10 ml on each side. The patients were discharged after a 30 min observation.

After the interfascial block of the trapezius, the pain levels of the patients before and after the procedure were evaluated with the numeric rating scale (NRS), 11-point pain scale, 0=No pain at all and 10=Worst pain imaginable. Patients with a reduction in pain ≥50% after the procedure were considered to have benefited from the procedure. The pain relief durations in patients who benefited from the procedure were recorded. The side with higher pain levels was evaluated in patients who underwent bilateral procedures. Analgesic drug use was recorded. Demographic data and descriptive statistics of the patients were used.

Results

In this study, a total of 54 patients (41 women and 13 men) between the ages of 24 and 88 years (mean 53.33) who underwent ultrasound-guided interfascial block of the trapezius associated with myofascial pain were evaluated. Twenty-five patients were injected in the area between the trapezius and suprascapular muscles, 10 between the trapezius and rhomboid muscles, and 19 between the trapezius and levator scapulae muscles. Twenty-six patients underwent unilateral procedures and 28 patients underwent bilateral procedures.

The mean pain duration of the patients in the past was 5.59 months (Table 1). The mean NRS values of the patients were 7.16 (5–9) before the procedure, 3.31 (0–8) 10 min after the procedure, and 3.37 (0–8) 1 week after the procedure. The number of patients who benefited from the procedure (patients with a 50% or more reduction in pain after the procedure) was 40 (74.07%) 10 min after the procedure. The number of patients who benefited from the procedure for up to 1 week, 1–2 weeks, 2 weeks–1 month, 1–3 months, and more than 3 months after the procedure was 38 (70.37%), 36 (66.66%), 31 (57.40%), 26 (48.14%), and 17 (31.48%), respectively (Table 2).

Twenty-two patients (40.74%) completely discontinued their pain medication after the procedure and 21 patients (38.88%) reduced their drug intake by varying rates.

Table 1. Patient demographics

Patient characteristics	n	%
Age (years)	53.33 (24–88)	
Sex		
Female	41	75.92
Male	13	24.07
Side		
Right	15	
Left	11	
Bilateral	28	
Level		
Trapezius-suprascapular	25	
Trapezius-rhomboid	10	
Trapezius-levator scapulae	19	
Pain duration (months)	5.59 (3–18)	

Table 2. Duration of pain relief in patients with a 50% or more reduction in pain after the procedure

Pain relief duration	Number of patients with a 50% or more reduction in pain after the procedure	
	n	%
10 min after the procedure	40	74.07
Up to 1 week after the procedure	38	70.37
1-2 weeks	36	66.66
2 weeks-1 month	31	57.40
1–3 months	26	48.14
More than 3 months	17	31.48

Discussion

Direct or indirect trauma, spinal pathology, vitamin deficiencies, sleep disorders, cumulative or recurrent strains, postural disorders, and loss of physical conditions are common etiological factors of MPS.[20,21] These factors may possibly increase the risk of developing microtrauma, which increases the development of trigger points.[21] Although the pathophysiological mechanism underlying the development of trigger points in patients with MPS is not clear, it can be explained by an inflammatory pathway. In this mechanism, the levels of inflammatory mediators increase and cause capillary compression, leading to tissue ischemia.[22,23] Once the trigger point develops, there is a decrease in ATP and glycogen levels within the trigger point, as well as an increase in substance P, acetylcholine, bradykinin, serotonin, and prostaglandin levels. These are associated with increased receptor sensitivity, which can cause excessive stimulation of the local afferent sensory nerves, causing pain perception at the trigger point.[24,25] Along with the increased metabolic need, the muscle and adjacent soft tissues undergo a structural change and destruction. Permanent sarcoma contracture is responsible for the chronic myofascial tenderness and local pain at trigger points.[22,23]

MPS is generally resistant to conventional pharmacological treatments.[14] In the treatment of MPS, the goal is usually to inactivate trigger points and loosen strained bands. Thus, a normal muscle length and function can be provided.[26,27] Injection techniques are one of the main treatment methods in the treatment of trigger points.[21,26] Interventional pain methods such as local anesthetic injections and dry injections are frequently used for this purpose.[26,27] In 29 patients with MPS, Kamanli et al.[9] administered lidocaine to trigger points in one group, dry injections in another group, and botulinum toxin type A injection in the third group. They found that pain pressure threshold values were significantly higher in the lidocaine group than in the dry injection group. Pain scores were also found to be significantly lower in the lidocaine group compared to the botulinum toxin type A and dry injection groups.

Each muscle has its own fascia that surrounds the skeletal muscle fibers and forms a thin layer between the adjacent muscles. These fasciae are important to support movement as they allow the independent movement of a muscle or fiber and form an interfascial space between muscles. The fascia has many functions including creation of a distinctive compartment between muscles and provision of circulatory support and protection.[18] Recently, some authors have reported that interfascial blocks provide pain palliation in patients with MPS.[14,15,28,29] The presence of nerve structures in the fascia has been histologically demonstrated. Therefore, the interfascial space may be useful for the administration of analgesic agents in MPS. Thus, muscle relaxation as well as de-

creased sensitivity are provided by blocking nerve fibers. This can help in rehabilitation of the affected muscle, using techniques such as muscle stretching.[14] An interfascial block is a newly applied method in patients with MPS and there are few studies demonstrating its effectiveness. Kongsagul et al.[30] observed that the most commonly treated muscle was the upper trapezius (19.5%) in 142 patients with MPS who underwent ultrasound-guided interfascial block using physiological saline solution. Therefore, we believe that pain palliation with an interfascial block in patients with MPS due to a trigger point in the trapezius will contribute to the literature.

Ultrasound has recently been widely used as an aid in injection techniques. With visualization, both accurate and effectiveness of the technique can be achieved, and complications can be reduced.[31] The interfascial space can be determined with an ultrasound-guided intervention in the form of a fusiform and an anechoic diffusion using the hydrodissection technique.[14] Domingo et al.[14] confirmed the spread of the solution in the interfascial space in their pathological and histological study of an ultrasound-guided interfascial block of the trapezius and showed a dense innervation passing through the interfascial space and fascia. This finding explains the effect of interfascial local anesthesia on myofascial pain. In their clinical study, they confirmed that the interfascial block of the trapezius could be as effective as that of the abdominal muscles. In 25 patients with MPS with an active trigger point in the trapezius muscle, the mean visual analog scale scores before the injection were 6.4 at rest and 7.6 during movement, and 10 min after the injection, they were 1 at rest and 1.6 during movement. In our study, the mean NRS values of the patients were 7.16 before the procedure, 3.31 after the procedure, and 3.37 at week 1.

Kongsagul et al. found that the 43.9% of patients had acceptable pain levels for more than 3 months after application of an ultrasound-guided interfascial block using physiological saline solution in various muscles. We found that the proportion of patients who benefited from an interfascial block for more than 3 months, only for the trapezius, was 31.48%.

Cho et al.[32] divided 36 patients with myofascial pain in the trapezius into two groups and applied a trapezius interfascial block with pulse radiofrequency (PRF) to the interfascial space of the trapezius in 18 patients; 10 ml of 0.6% lidocaine was used in 18 patients. While there was no significant difference between the groups in the NRS scores 2 weeks after the procedure, they were found to be significantly lower in the PRF group 4 and 8 weeks after the procedure compared to the interfascial block group.

McDonnell et al.[15] and Hebbard[16] defined an ultrasound-guided block for analgesia and anesthesia of the abdominal wall and named this block as the transversus abdominis plane (TAP) block. They have shown that local anesthetic injection between the TAP block and the fascia of the internal oblique and transverse muscles provides analgesia of the abdominal wall. In this technique, afferent neuronal pathways of the abdominal wall are blocked.

Park et al.[17] conducted a study comparing the effects of ultrasound-guided interfascial pulsed radiofrequency and ultrasound-guided interfascial injection for MPS of the gastrocnemius muscle. While the NRS scores were significantly higher in the pulsed radiofrequency group immediately after the procedure compared to the injection group, the scores were found to be significantly lower at weeks 2 and 4 after the procedure, indicating that interfascial PRF treatment may be used as an alternative treatment for MPS.

The limitations of our study include its retrospective design and that a control group was not included. Pain relief lasting for months was achieved in most of the patients. Repeated blocks can provide effective and long-lasting pain relief. We believe that ultrasound-guided interfascial block of the trapezius is effective for the treatment of MPS based on trigger points. Further studies are needed to support our results.

Ethical Approval: The study was approved by The Samsun Training and Research Hospital Non-interventional Clinical Research Ethics Committee (Date: 09/12/2020, No: 2020/16/5).

Conflict-of-interest issues regarding the authorship or article: None declared.

Financial Disclosure: This study has no funding or sponsor.

Peer-rewiew: Externally peer-reviewed.

References

1. Chou LW, Kao MJ, Lin JG. Probable mechanisms of needling therapies for myofascial pain control. Evid Based Complement Alternat Med 2012;2012:705327. [CrossRef]
2. Fleckenstein J, Zaps D, Rüger LJ, Lehmeyer L, Freiberg F, Lang PM, et al. Discrepancy between prevalence and perceived effectiveness of treatment methods in myofascial pain syndrome: Results of a cross-sectional, nationwide survey. BMC Musculoskelet Disord 2010;11:32. [CrossRef]
3. Simons DG. New views of myofascial trigger points: Etiology and diagnosis. Arch Phys Med Rehabil 2008;89:157–9.
4. Harden RN, Bruehl SP, Gass S, Niemiec C, Barbick B. Signs and symptoms of the myofascial pain syndrome: A national survey of pain management providers. Clin J Pain 2000;16:64–72. [CrossRef]
5. Gerwin RD. Classification, epidemiology, and natural history of myofascial pain syndrome. Curr Pain Headache Rep 2001;5:412–20. [CrossRef]
6. Skootsky SA, Jaeger B, Oye RK. Prevalence of myofascial pain in general internal medicine practice. West J Med 1989;151:157–60.
7. Fishbain DA, Goldberg M, Meagher RB, Steele R, Rosomoff H. Male and female chronic pain patients categorized by DSM-III psychiatric diagnostic criteria. Pain 1986;26:181–97. [CrossRef]
8. Kaergaard A, Andersen JH. Musculoskeletal disorders of the neck and shoulders in female sewing machine operators: Prevalence, incidence, and prognosis. Occup Environ Med 2000;57:528–34. [CrossRef]
9. Kamanli A, Kaya A, Ardicoglu O, Ozgocmen S, Zengin FO, Bayik Y. Comparison of lidocaine injection, botulinum toxin injection, and dry needling to trigger points in myofascial pain syndrome. Rheumatol Int 2005;25:604–11. [CrossRef]
10. Yildirim MA, Öneş K, Gökşenoğlu G. Effectiveness of ultrasound therapy on myofascial pain syndrome of the upper trapezius: Randomized, single-blind, placebo-controlled study. Arch Rheumatol 2018;33:418–23. [CrossRef]
11. Shah JP, Phillips TM, Danoff JV, Gerber LH. An *in vivo* microanalytical technique for measuring the local biochemical milieu of human skeletal muscle. J Appl Physiol (1985) 2005;99:1977–84. [CrossRef]
12. Narvani AA, Tsiridis E, Kendall S, Chaudhuri R, Thomas P. A preliminary report on prevalence of acetabular labrum tears in sports patients with groin pain. Knee Surg Sports Traumatol Arthrosc 2003;11:403–8. [CrossRef]
13. Hong CZ. Lidocaine injection versus dry needling to myofascial trigger point. The importance of the local twitch response. Am J Phys Med Rehabil 1994;73:256–63. [CrossRef]
14. Domingo T, Blasi J, Casals M, Mayoral V, Ortiz-Sagristá JC, Miguel-Pérez M. Is interfascial block with ultrasound-guided puncture useful in treatment of myofascial pain of the trapezius muscle? Clin J Pain 2011;27:297–303. [CrossRef]
15. McDonnell JG, O'Donnell B, Curley G, Heffernan A, Power C, Laffey JG. The analgesic efficacy of transversus abdominis plane block after abdominal surgery: A prospective randomized controlled trial. Anesth Analg 2007;104:193–7.
16. Hebbard P. Subcostal transversus abdominis plane block under ultrasound guidance. Anesth Analg 2008;106:674–5.
17. Park SM, Cho YW, Ahn SH, Lee DG, Cho HK, Kim SY. Comparison of the effects of ultrasound-guided interfascial pulsed radiofrequency and ultrasound-guided interfascial injection on myofascial pain syndrome of the gastrocnemius. Ann Rehabil Med 2016;40:885–92. [CrossRef]
18. Benjamin M. The fascia of the limbs and back--a review. J Anat 2009;214:1–18. [CrossRef]
19. Stecco A, Macchi V, Masiero S, Porzionato A, Tiengo C, Stecco C, et al. Pectoral and femoral fasciae: Common aspects and regional specializations. Surg Radiol Anat 2009;31:35–42. [CrossRef]
20. Kang JJ, Kim J, Park S, Paek S, Kim TH, Kim DK. Feasibility of ultrasound-guided trigger point injection in patients with myofascial pain syndrome. Healthcare (Basel) 2019;7:118.
21. Han SC, Harrison P. Myofascial pain syndrome and trigger-point management. Reg Anesth 1997;22:89–101. [CrossRef]
22. Maher RM, Hayes DM, Shinohara M. Quantification of dry needling and posture effects on myofascial trigger points using ultrasound shear-wave elastography. Arch Phys Med Rehabil 2013;94:2146–50. [CrossRef]
23. Vulfsons S, Ratmansky M, Kalichman L. Trigger point needling: Techniques and outcome. Curr Pain Headache Rep 2012;16:407–12. [CrossRef]
24. Jensen R, Rasmussen BK, Pedersen B, Olesen J. Muscle tenderness and pressure pain thresholds in headache. A population study. Pain 1993;52:193–9. [CrossRef]
25. Thompson JM. The diagnosis and treatment of muscle pain syndromes. In: Braddom RL, editor. Physical Medicine and Rehabilitation. 2nd ed. Philadelphia, PA: WB Saunders; 2000. p.934–56.
26. Alvarez DJ, Rockwell PG. Trigger points: Diagnosis and management. Am Fam Physician 2002;65:653–60.
27. Borg-Stein J, Simons DG. Focused review: Myofascial pain. Arch Phys Med Rehabil 2002;83(Suppl 1):S40–9. [CrossRef]
28. French JL, McCullough J, Bachra P, Bedforth NM. Transversus abdominis plane block for analgesia after caesarean section in a patient with an intracranial lesion. Int J Obstet Anesth 2009;18:52–4. [CrossRef]
29. Tran TM, Ivanusic JJ, Hebbard P, Barrington MJ. Determination of spread of injectate after ultrasound-guided transversus abdominis plane block: A cadaveric study. Br J Anaesth 2009;102:123–7. [CrossRef]
30. Kongsagul S, Vitoonpong T, Kitisomprayoonkul W, Tantisiriwat N. Ultrasound-guided physiological saline injection for patients with myofascial pain. J Med Ultrasound 2019;28:99–103.
31. Kumbhare D, Singh D, Rathbone H A, Gunn M, Grosman-Rimon L, Vadasz B, et al. Ultrasound-guided interventional procedures: Myofascial trigger points with structured literature review. Reg Anesth Pain Med 2017;42:407–12.
32. Cho IT, Cho YW, Kwak SG, Chang MC. Comparison between ultrasound-guided interfascial pulsed radiofrequency and ultrasound-guided interfascial block with local anesthetic in myofascial pain syndrome of trapezius muscle. Medicine (Baltimore) 2017;96:e6019. [CrossRef]