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THE USE OF DRY NEEDLING TO TREAT PAINFUL SHOULDER SYNDROME: A CASE REPORT

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A – study design, **B** – data collection, **C** – statistical analysis, **D** – interpretation of data, **E** – manuscript preparation, **F** – literature review, **G** – sourcing of funding

ABSTRACT

Background: Painful shoulder syndrome is a common condition in society. Most patients experience pain and reduced mobility of the affected limb, which can have an impact on the quality of life. This report presents a case of a patient with pain and reduced range of motion in the left shoulder.

Aim of the study: The study aim was to evaluate the efficacy of dry needling in the treatment of painful shoulder syndrome, based on functional measures of pain, disability and range of motion.

Case report: A 42-year old patient reported pain in her left shoulder. A series of 6 dry needling sessions were performed, twice a week, for a period of 3 weeks. Prior to, and immediately after, the therapy a subjective pain assessment using the VAS pain rating scale and an assessment of the degree of disability using the Modified Laitinen Pain Questionnaire were performed. The range of motion within the shoulder girdle was also measured with a goniometer.

Conclusions: Following the dry needling therapy, a reduction in pain and improved shoulder girdle mobility was observed.

KEYWORDS: painful shoulder syndrome, dry needling, VAS scale, Laitinen Questionnaire, goniometer

Background

Painful shoulder syndrome, similar to lower back pain, is a musculoskeletal disorder that affects an increasing number of people. This syndrome is measured by both clinical signs and structural changes, as seen in medical imaging [1]. It can be caused by degenerative changes, and damage or injury to individual functional elements that are part of the shoulder girdle. Recurrent microtraumas in joints in this area offer another causative pathway [2].

The most common symptom of the painful shoulder syndrome is the presence of pain and a significant reduction in mobility, which impedes daily activities and thus the quality of life of the patient [3]. The therapeutic approach to alleviate this syndrome includes conservative treatments, such as pharmacotherapy, kinesiotherapy, physical therapy and massage [4]. An increasingly popular methods for pain management is dry needling, which can also improve joint range of motion and patterns of muscle activation [5].

Dry needling was first used by Karel Lewit, a physician from the former Czechoslovakia. This therapy usually involves a series of muscular punctures at different angles to induce a muscle contraction [6]. The purpose of dry needling therapy is to provoke a local twitch response, which in effect induces a relaxation of the entire treated muscle.

Research suggests that dry needling can effectively reduce pain, improve mobility and significantly enhance a patient's daily functioning. Dry needling has been shown to be an effective intervention in patients with chronic shoulder pain and a limited range of motion. Pain reduction is achieved, among other things, by stimulation of myofascial trigger points, which can be extremely sensitive to pressure [7].

Aim of the study

The purpose of this study was to assess the efficacy of dry needling in the treatment of painful shoulder

syndrome, as determined by functional measures of pain, disability and range of motion.

Case report

The subject for this case report was a 42-year-old female (height 175 cm, weight 83 kg and BMI 27.1) who reported pain in her left shoulder during the interview. The pain was exacerbated when trying to perform flexion and abduction movements within the shoulder joint. It had started about three months earlier after a workout at the gym, without injury. The greatest ailments were noticeable on the anterior and lateral sides. The patient had not previously complained of pain in the left shoulder area. She defined the pain as a pulsing, burning and pulling sensation. She reported difficulty in performing basic tasks such as reaching up, lifting a limb to get her hair done, fastening her bra, putting on a T-shirt or sweater. During each of these activities, she reported some pain and a limited range of motion in the shoulder area. The patient is physically active, and regularly engages in cycling, roller skating and gym workouts.

Based on an ultrasound examination (Fig. 1) the patient's right shoulder area was diagnosed with minor damage to the tendon of the infraspinatus muscle and associated edema. No lesions in the tendon of the long head of biceps brachii muscle, and no abnormalities in the acromioclavicular joint, were evident. A blood test conducted during the time of pain did not indicate any inflammation.

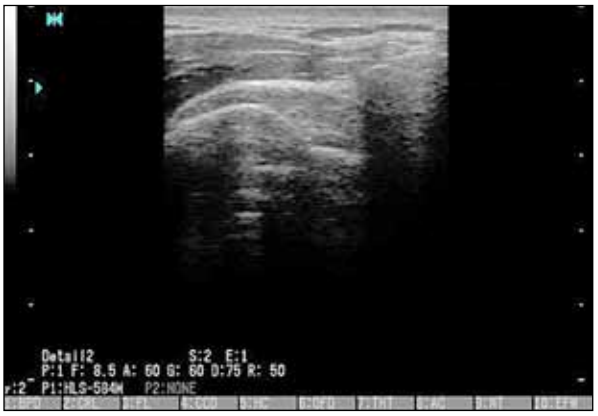

Figure 1. Ultrasound result of the patient [personal records].

The patient's body posture was also examined. Slight asymmetry of the location of the shoulder girdle, as well as the position of the upper limb during adduction and internal rotation, was observed. The range of flexion, extension and abduction movements of the arm were assessed.

Prior to the study, the patient was informed of the purpose and principles of the dry needling treatment, at which time the benefits and possible side effects were presented. The patient gave written consent to participate in the study, which was approved by the Bioethical Commission of the state medical higher vocational school in Opole (no. KB/258/FI/2020).

Therapy

The patient was treated using dry needling twice a week for a period of 3 weeks – a total of 6 procedures were carried out. During each session, dry needling was performed on the trigger points of the infraspinatus and levator scapulae muscles, the descending part of the trapezius muscle, and the anterior and intermediate part of the deltoid muscle. The exact location and depth of penetration were controlled using real-time ultrasound (Fig. 2). Disposable sterile therapeutic needles (manufactured by SOMA, Poland), made of Japanese stainless steel, 0.3 mm thick and 30 and 50 mm long, were used for the treatment. Each session lasted about 40 minutes. The procedures were performed in a manner to ensure the patient's comfort, whilst following hygiene and safety regulations.

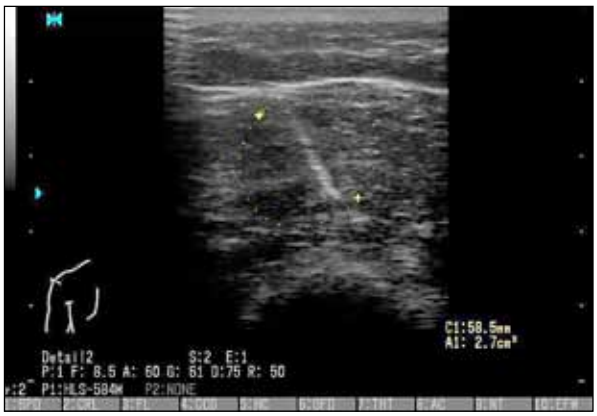

Figure 2. Ultrasound image of dry needling applied to the intermediate part of the deltoid muscle.

Therapy efficacy was determined by 3 functional outcomes. To describe the subjective measure of pain, the visual analog scale (VAS) was used in which the patient self-reported measures of symptoms on a simple 0-10 scale (0 – "no pain", 10 – "the worst pain").

To assess the degree of disability, the Modified Laitinen Pain Questionnaire was used, which contains questions about 4 criteria: pain intensity, frequency of pain, use of painkillers, and decrease in mobility. The patient described each criterion using a 5-step scale:

- 0 indicates no pain, no medication use, and full mobility,
- 1 indicates mild, intermittent pain, use of medication only in case of emergency and partial decrease in mobility,
- 2 indicates severe, frequent pain, frequent use of medicines in low doses, and reduced mobility preventing work,
- 3 indicates very frequent and severe pain, so the patient needs partial help,
- 4 means that the pain is constant and very severe, so the patient needs complete assistance.

The range of motion in the shoulder joint and within the shoulder girdle was measured using a goniometer. Each movement was made and scored three times, giving the average value. All tests were carried out before and after the treatment period by the same therapist.

Results

The patient reported a reduction in pain by 6 points according to the VAS scale. Before the therapy, the patient assessed pain at the level of 7 points, which may indicate severe pain, while after the therapy she assessed pain at the level of 1 point.

An improvement in the degree of disability according to the Modified Laitinen Pain Questionnaire was also observed (Tab. 1).

Table 1. Comparison of changes in pain as assessed with the Laitinen Questionnaire before and after the treatment.

Laitinen scale criteria	The sum of points	
	Before treatment	After treatment
Intensity of pain	2	1
Frequency of pain	2	0.5
Use of painkillers	2	0
Decrease in mobility	1	0

The patient also experienced an increase in the range of flexion, extension and abduction movements around the shoulder girdle following the treatment period (Tab. 2).

Table 2. Measurements of selected ranges of motion within the patient's shoulder girdle before and after therapy.

Range of motion	Sagittal plane		Coronal plane
	Flexion	Extension	Abduction
Before treatment	80°	30°	75°
After treatment	165°	50°	155°

Discussion

Dry needling is being used increasingly to relieve pain associated with muscular disorders. In the described case study, dry needling therapy was shown to be effective in reducing pain and increasing range of motion of the shoulder girdle. This therapeutic method does, however, require knowledge and skills in the identification of tissues which exhibit increased tension and soreness. Proper anatomical knowledge, experience and an individual approach to each patient is essential.

According to Dommerholt [5], dry needling, in addition to reducing local pain, increases the range of motion and patterns of muscle activity, whilst inducing changes in the chemical environment of localized trigger points. Polish researchers [6] have described dry needling as an effective technique when analyzing various methods for the treatment of myofascial trigger points. In their report, Arias-Buría et al. [8] evaluated the effects of using a one-off dry needling session on trigger points in postoperative shoulder pain. Their findings suggest that a single procedure can reduce pain and increase shoulder functioning in people with postoperative pain.

Evidence confirming the effectiveness of the dry needling method was presented by Li Tang et al. [9]. They performed a series of procedures on a patient suffering from spasticity within the shoulder joint. Their results suggest that dry needling in the myofascial trigger points can effectively increase arm range of motion. Other researchers [10], following a meta-analysis of relevant data, suggest that dry needling is effective in short-term pain management, increasing range of motion, and improving the quality of life.

As in our case report, Clewley et al. [11] presented results indicating the effectiveness of dry needling in both reducing pain and increasing joint (shoulder) range of motion. Additionally, Passigli et al. [12] reported a beneficial effect of dry needling therapy in a patient with painful shoulder syndrome, where they observed an immediate improvement in mobility and a significant reduction in pain. They also suggest conducting further research to determine long-term outcomes. In a randomized controlled clinical trial, Ziaeifar et al. [13] evaluated the efficacy of dry needling in patients suffering from pain in the descending part of the trapezius muscle. Consequent to receiving positive results, they recommended this method for pain management.

The broad application of dry needling was further demonstrated by Calvo-Lobo et al. [14]. They evaluated the effectiveness of this therapy in treating nonspecific shoulder pain in an elderly population. The primary result was significant pain relief in these patients.

Collectively, these findings confirm the usefulness of dry needling therapies as a tool to alleviate painful shoulder syndrome and associated outcomes. The results of our study indicate that, a relatively short treatment schedule (6 sessions over 3 weeks), can promote improvements that approach normal healthy functioning. It is, therefore, appropriate to use dry needling as a non-pharmacological and increasingly accessible method. Further studies are warranted using a larger cohort, and for a longer observational period, so that potential long-term effects can be evaluated, e.g. one month after the end of the treatment.

Conclusions

In this case study, the dry needling method was found to be effective in treating painful shoulder syndrome and related outcomes in our patient. The primary outcomes included a significant reduction in pain and an increase in the range of motion in the shoulder examined.

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