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Case Report

From Spasm to Sensation: Dry Needling's Impact on Impaired Sensation with Tibial Nerve Entrapment after ACL Injury

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Abstract

Muscle Spasm of Gastrocnemius muscle may be associated with Anterior Cruciate Ligament (ACL) injury and consequently the compression secondaryat Tibial Nerve. This finding has not been commonly reported in the present literature. The diagnosis of compression secondary at tibial nerve due to gastrocnemius muscle spasm in ACL injury may be suppressed especially in the case of trauma where inflammation may occur because of multiple muscle fibre strain consequently leading to the loss of sensation in toes of foot. This is a case report which indicates that muscle spasm of gastrocnemius may be one of the reasons of motor and sensory loss in the toes of foot, a rare finding. The management was undertaken by Dry needling targeting myofascial trigger points (MTrPs) in gastrocnemius muscle to induce clinical effects.

Keywords: Spasm; Sensation; Dry Needling's; Tibial Nerve; ACL Injury

Introduction

Spasm in skeletal muscles can occur or develop over time because of over stress, arthritic/degenerative changes in musculoskeletal system or consequently due to an injury of nearby structure(s). This presents as myofascial pain syndrome as trigger points and movement restriction are commonly seen [1,2]. These spasms are disabling and painful with the functional loss. The Anterior Cruciate Ligament (ACL) support knee by prevention of excessive anterior translation of tibia. According to Zbrojkiewiczand colleagues, the yearly occurrence of ACL injuries rose by 43% (from 54.0 to 77.4 per 100,000 individuals), and by 74% among those under 25 years old (from 52.6 to 91.4 per 100,000 individuals) from 2000-2015 [3]. Treatment is largely conservative with reconstruction surgery indicated with severe grade of ACL injury.

Due to the trauma to the knee, adjoining muscles are also affected and this is frequently not taken care of while the focus of the therapist is on ACL rehabilitation and return to functional activities. Treatment techniques, in the muscles developing spasms due to formation of trigger points following injury, have been found to be significantly effective with dry needling. The present study reports a case of numbness and loss of movement in the 4th and 5th toes, which were corrected by using dry needling technique.

Case Report

A female patient aged 34 years of age presented to the Physiotherapy Clinic with chief complain of pain and stiffness in right knee with loss of sensation and movement in the 4th and 5thtoe of right foot. A detailed history was taken to understand the mechanism of injury. The patient reported a history of road traffic accident (RTA) and fall from two-wheeler with abnormal weight transfer to the right knee felt by the patient during the time of fall. The patient was taken to the hospital for management of the injuries sustained as a result of RTA where the focus was primarily on trauma care management. Initial examination did not focus on knee discomfort due to the severity of other injuries. On recovery and hospital discharge, the right knee pain became evident for which the patient had to take further consultation from an orthopedician. On radiological examination, magnetic resonance imaging (MRI) revealed Grade I ACL tear followed by immobilization of right knee immediately with bandage as first line management of the symptoms of pain and instability.

Pharmacological intervention was started with non-steroidal anti-inflammatory drugs for pain relief and the case was referred to the Physiotherapist after two days post hospital discharge for symptomatic management and prescription of exercises for ACL rehabilitation. As an initial step of physiotherapy management, while examining the patient, physiotherapist discovered sensory impairment and loss of movement in the 4th and 5th toe of the right foot secondary to the ACL tear. In depth sensory examination revealed, superficial sensation was lost in both the toes when assessed with pointed end of the reflex hammer with no voluntary movement at the toes. Mild swelling and tenderness were also evident from examination of the right knee. A strange finding in addition to sensory impairment was presence of severe muscle spasm in calf muscles than the other surrounding musculature.

Pre-Interventional assessment

Scoring of the severity of pre findings was undertaken by a self-administered questionnaire [4] and pre assessment score was 36. Trigger points were felt over the lateral head of the gastrocnemius when assessed by palpation [5]. Pain intensity was measured by Numeric Pain rating scale (NPRS).

To manage the muscle spasm and treat the trigger points, dry needling was chosen as the intervention. Prerequisites for the intervention included written informed consent and thorough explanation of the condition and procedure in the patient's native language. After ensuring that the patient gave voluntary consent, treatment of the patient was started.

Intervention procedure

The patient was instructed to lie down prone. The therapist wore gloves. Using an alcohol swab, the treatment area was exposed and thoroughly cleaned. The therapist stood on the side of the patient receiving therapy. A sterilized needle of size 40 mm × 0.25 mm was inserted in the upper trigger point of lateral gastrocnemius muscle started from the middle of the line dividing both heads to the fibular line, parallel to the floor. Several flickers were noticeable while using the fishing technique. After removing the needle, the region was wiped with an alcohol swab. This was followed by stretching of gastrocnemius for a duration of 15 seconds 3 repetitions [6] and icing [7] over the area of needling.

Post intervention assessment

After dry needling intervention, Patient was assessed for pain intensity by NPRS, Spasm score by self-administered questionnaire score and sensory assessment was also done.

Results

Immediately after this dry needling intervention, surprising results were seen. The patient showed a great relief in the symptoms of pain and significantly improved the outcomes of spasm, stiffness and movement of the 4th and 5th toes started with near normal sensations checked by asking the patient. Table 1 shows the pre and post intervention score of all outcome measures.

Outcome Variable	Baseline	Immediately After Treatment
Intensity of Pain (Visual Analogue Scale Score)	9	4
Score of Spasm	36	12
Sensation at little and ring toes	lost	Normal
Movement of little and ring toes	lost	Normal

Table 1: Outcome Measures Pre and Post Intervention assessment.

Patient follow up

The patient revisited the clinic next day with much lesser pain, and further management of ACL tear was started with the ACL injury exercise protocol [8]. This helped the patient to recover from ligament injury and there was significant reduction of pain and stiffness at knee, with improvement in range of motion and strength.

Discussion

The case opens many prospects in Physiotherapy practices with the surprising results of outcome variables. Dry needling immediately relieved the spasm induced by the development of trigger points [1,6] which may have resulted secondary to the injuries sustained by the road side accident.

Previous researches have also supported the fact that dry needling is a novel and effective treatment approach for patients with not just musculoskeletal injuries but also in stroke. Valencia-Chulián and colleagues findings from a systematic review are in line with our study findings and reported that in 7 randomized controlled trials on stroke survivors included in his systematic review, there was documented improvement of spasticity level, pain intensity, and ROM after the use of DN, alone or combined with other interventions.

Dry needling approach is also used to manage pain associated with trigger points and neuromuscular impairment [10], and has been shown to affect passive mechanical muscle properties [11]. In a study undertaken on ACL injured subjects, small improvements in knee flexion ROM and pain after one session of dry needling therapy. The findings also indicated towards changes in resting surface electromyography (sEMG) for knee muscle Vastus lateralis (VL) [11].

Mononeuropathies are dysfunctions of the nerves that are often caused by local injuries including tearing, mechanical impact, impingement, or other continuous pressure sources. Particularly with tibial neuropathies, impingement or injury are sometimes substantially implicated [12]. Compression of Tibial nerve under the cover of gastrocnemius could be the reason for the sensory and motor loss at the toes [13]. Page and his collegues pointed towards vascular compression resulting in mononeuropathy of the tibial nerves is a rare clinical entity [12].

The fall during the accident would have caused the protective spasm of gastrocnemius muscle while ACL was injured [14,15]. Dry needling approach released the muscle and its fascia helps in returning the elasticity and original length of the fascia of the muscle [4,5,16,17] and thus relieving the muscle spasm and from trigger points as happens with conventional therapies like stretching [18].

Some of the limitations of this case report include use of patient reported subjective outcome measures for pain and sensory impairment. In future, studies on dry needling intervention with larger cohorts are needed to generate substantial evidence. In addition studies on mononeuropathies and vascular compression after injury are also warranted.

Conclusion

Dry needling intervention is an effective approach for treatment of myofascial trigger points and muscle spasm. It was concluded from the findings of this case study that the dry needling intervention significantly improved patient outcomes like pain and spasm score which lead to symptomatic relief in patients. Patient recovered from numbness and loss of movement associated with moderate to severe spasm of the muscle overlying the tibial nerve.

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