Case Report

Long-term effect of dry needling on rectus femoris in reducing anterior knee pain and improving functional activities – A 1-year case report

ABSTRACT

Rectus femoris is a biarticular muscle so during walking it acts as a hip flexor and knee extensor simultaneously its important role is controlling the swing phase gait. Reducing rectus femoris activity may produce an increased knee flexion and inappropriate foot ground and increased activity reduces knee flexion and hinders foot clearance. Dry needling is the use of a thin monofilament needle inserted into the muscle which releases endogenous opioids which is a mechanism of pain suppression it also helps to decrease muscle tightness and increase blood flow to the muscle significantly. We reported a typical case of anterior knee pain, in a 39-year-old male with severe activity limitation and intense pain in the anterior knee during stair climbing. Pain and activity limitation in terms of disability were assessed on the 1st day of outpatient department. Two days of dry needling were given and posttest scores of pain and activity limitation were again taken on the 2nd day, 1 month, and after 1 year. After 2 days of intervention, the pain score measured by Visual Analog Scale (VAS) reduced from 8 to 5 and after 1 month the pain score was 0. Similarly, the KUJALA SCORING QUESTIONNAIRE showed improvement in functional activity, after 2 days of intervention the activities improved from 52 to 56, and after 1-month functional score was 100. A follow-up was taken after a year which presented VAS to be 0 and KUJALA SCORING QUESTIONNAIRE to be 100. The results of this study found the long-term effect of dry needling helps to reduce anterior knee pain and improve functional capacity which suggests dry needling on rectus femoris is a better treatment option effects can last for a long period for patients with anterior knee pain and functional limitation.

Keywords: Anterior knee pain, dry needling, functional limitation, long-term effect

خلاصة

تعتبر العضلة الرباعية الأمامية عضلة ترتبط بمفصلين ففي خلال المشي تعمل لثني مفصل الحوض و بسط الركبة بنفس الوقت و تعتبر مهمة للتحكم بمرحلة الطيران أثناء المشي. تقليل نشاط عضلة الرباعية قد ينتج زيادة في ثني الركبة و تسطيح القدم على الأرض بشكل غير كافي و زيادة نشاطة ينتج عنه قلة في ثني الركبة وزيادة في انبطاح القدم. استخدام الإبر الجافة هو عبارة عن استخدام ابر نحيفة تدخل على العضلة بشكل مباشر لتفرز مسكنات الألم وهي تساعد في قصر العضلة و زيادة تدفق الدم بها بشكل واضح.

تقريرنا عن حالة شخص يعاني من ألم في مقدمة الركبة، عمره 39 مع ألم حاد و قلة واضحة في النشاطات خاصة في صعود الدرج. الألم و النشاطات المحدودة قد قيسا منذ اليوم الأول في قسم المراجعيين الخارجيين. تم استخدام الإبر الجافة لمدة يومين و تم قياس بعدها حدة الألم و النشاطات المحدودة في اليوم الثاني، بعد شهر، و بعد سنة كاملة.

بعد يومين من العلاج، حدة الألم التي قيست باستخدام .... (VAS) قد قلت من 8 إلى 5، وبعد شهر حدة الألم أصبحت صفر. كذلك، استبيان مقياس كوجالا قد وضح تقدم في النشاطات الوظيفية بعد يومين من العلاج حيث تحسنت النشاطات من 52 إلى 56، و بعد شهر كانت نتيجة القياسات الوظيفية تعادل 100.

تم عمل مراجعة مع الحالة بعد سنة كاملة من العلاج، و وجد معدل الألم ٠ باستخدام مقياس (VAS) و أما استبيان مقياس كوجالا كان معدله 100. نتائج هذه الدراسة تثبت تأثير الأبر الجافة طويل المدى لتخفيف ألم الركبة الأمامي و تساعد على القدرة الوظيفية، مما يُقترح أن استخدام الأبر الجافة على عضلة الفخذ الأمامية هو حل علاجي أفضل و من الممكن أن يكون تأثير فترته طويلا للمرضى الذين يشتكون من ألم الركبة الأمامي والقصور الوظيفي

الكلمات المفتاحية: ألم الركبة الأمامي، الأبر الجافة، القصور الوظيفي، تأثير طويل المدى.

Asifuzzaman Shahriyar Ahmed, Charuhasini Mahaptra

Department of Musculoskeletal and Sports, Abhinav Bindra Sports Medicine and Research Institute, Cuttack, Odisha, India

Address for correspondence: Prof. Asifuzzaman Shahriyar Ahmed,
C/O Dr. Mirza Iqbal Baig, Dargha Bazar, Near Haati Talab, Buxi Bazar, Cuttack, Odisha, India.
E-mail: asif.ahmed@absmari.com

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INTRODUCTION

The knee can be conceptualized as two joints – a tibiofemoral and a patellofemoral joint. The tibiofemoral joint allows transmission of body weight from the femur to the tibia while providing hinge-like, sagittal plane joint rotation along with a small degree of tibial axial rotation. Functionally, the quadriceps muscle group and patellofemoral articulation – along with the tibialis anterior and ankle joint – act to dissipate forward momentum as the body enters the stance phase of the gait cycle.[1] The patellofemoral articulation is commonly referred to as the extensor mechanism. Although true that the concentric action of this motor unit is an extension of the knee, functionally, the quadriceps acts eccentrically during gait, running, or jumping.[2] The rectus femoris parallels the vastus intermedius but runs in the reticular layer. It originates on the anteroinferior iliac spine of the pelvis and blends into the central tendon of the quadriceps. The rectus femoris, along with the vastus medialis obliquus, vastus medialis, vastus lateralis, and vastus lateralis obliquus, terminates in an aponeurosis that merges into the anterior-third joint capsule, which is, in essence, the reticular layer. The remaining muscles of the quadriceps are inserted at an angle to the axis of the femur.[3]

Rectus femoris is a biarticular muscle so during walking it acts as a hip flexor and knee extensor simultaneously. It is important role in controlling the swing phase gait. Reducing rectus femoris activity may produce an increase in knee flexion and inappropriate foot ground and increased activity reduces knee flexion and hinders foot clearance.[4] Dry needling is the use of a thin monofilament needle inserted into the muscle which releases endogenous opioids which is a mechanism of pain suppression it also helps to decrease muscle tightness and increase blood flow to the muscle significantly its time-period mainly consists of 10 s–20 min depending on the condition.[5] There are several researches done on the immediate effect of dry needling on pain and functional limitation but there are limited studies on the long-term effect of dry needling.[6,7]

Purpose of the study

To observe the long-term effect of dry needling on the rectus femoris muscle in reducing anterior knee pain and improving functional activities.

CASE REPORT

A 39-year-old male patient came to the outpatient department (OPD) complaining of pain in the right knee and having difficulty in performing his functional activities (ascending stairs) and he was alright for 2 days. When he climbed the stairs at that time, he felt pain in his right knee. He then visited the outpatient department for further management. The patient had no significant history of the same. Assessment of pain showed a sudden onset of dull aching type of pain which was intermittent in nature. Ascending stairs was difficult to perform. On observation, the patient had difficulty straightening his right knee and mild swelling on the anterior aspect of the thigh. On palpation, the patient has tenderness of grade 4 on the anterior aspect of the thigh. On examination, the flexion range of motion of the knee joint was 0°–90° and extension range of motion was full with the presence of pain and the range of motion of the hip joint was full and free. Muscle power was assessed by medical research council grading of manual muscle testing. The grading is as follows: knee flexors 3+ (within available range), knee extension 3 (within available range) hip flexors, extensors, abductors, adductors, and rotators were 4. The resisted isometric contraction test for the quadriceps was positive. There were no significant findings during the joint play. To assess the pain Visual Analog Scale (VAS) was used and the baseline score was 8. To assess the functional disability KUJALA SCORING QUESTIONNAIRE was used and the baseline score was 52. To differentiate this case from ligament injury, a ligament stress test was performed which turned out to be negative. To differentiate this case from patellofemoral pain syndrome CRIAGE test was performed which turned out to be negative. From the above-mentioned history and clinical findings, it was concluded the condition was fascial tightness of the rectus femoris.

Intervention

Dry needling

One session of dry needling with a disposable stainless-steel needle of 75 mm was inserted over the belly of the rectus femoris [Figure 1]. Fishing technique of dry needling with the needle inserted at an angle of 45°. Dry needling was performed once for 10–15 min for 2 days. The insertion of the needle was confirmed by seeing the muscle twitch over the rectus femoris muscle. During the procedure, the part to be treated was cleaned with isopropyl alcohol, and the therapist

Figure 1: Dry needling on rectus femoris

used latex gloves during the procedures. To avoid the needle injury, disposal was done in the appropriate container.

RESULTS

A single session of dry needling was used. After 2 days of intervention, the pain score measured by VAS, was reduced from 8 to 5, and after 1 month the pain score was 0. Immediate score was not measured because of the presence of soreness in the muscle (posttreatment). Similarly, the KUJALA SCORING QUESTIONNAIRE showed improvement in functional activity, after 2 days of intervention the activities improved from 52 to 56, and after 1-month functional score was 100.

A follow-up was taken after a year which presented VAS to be 0 and KUJALA SCORING QUESTIONNAIRE to be 100 as given in Table 1. No adverse effects were found during and after treatment.

DISCUSSION

The results of this case study found improvement in myofascial tightness of the rectus femoris with dry needling. Dry needling helps to activate various sensory pathways and noxious inhibit control system resulting in neuromodulators in pain signaling. It also activates spinal segmental pain inhibitory and descending pain control pathways. Needle manipulation stimulates the release of endogenous opioids which is a mechanism of pain suppression in peripheral and spinal cord-level conditions. According to Navarro-Santana *et al*. after applying a single session of dry needling there were changes in central pain processing pathways.[6] As per the previous study done by Chys *et al*. there was no significant difference between dry needling and sham needling on pain modulation in patients with chronic neck pain.[7] A single session of dry needling generated local and distant hypoalgesic responses which showed a significant reduction in pain as compared to the control group.[8] A previous meta-analysis showed that a single session of dry needling helped to reduce pain in patients with myofascial pain syndrome. It helps to reduce pain in acute myofascial syndrome.[9,10] Dry needling showed a long-term effect on tennis elbow and plantar fasciitis, and considering functional limitation dry needling was superior to improve functional capacity as compared to sham, no control group.[11] According to a previous study dry needling helps to reduce muscle stiffness and improve range of motion in patients with posterior shoulder tightness.[12] As per the previous research, dry needling helps to improve pain and functional capacities as compared to only exercise in patients with patellofemoral pain syndrome.[13] This study also found similar results following 2 days of dry needling improvement in KUJALA SCORING QUESTIONNAIRE and reduction in pain which was measured by VAS which showed that dry needling activates the pain gate mechanism and effect on central pain modulation. Thereby pain reduction took place drastically. The major limitation of this study was that midterm follow-up was not taken. The findings of this report can also be used for generalized muscle tightness and myofascial tightness.

Table 1: Pre-post and follow-up score of the case for pain and functional limitation

Outcome	VAS	Kujala Scoring Questionnaire
Baseline	8	52
2 days after intervention	5	56
1 month after the intervention	0	100
1 year follow-up after intervention	0	100

VAS=Visual Analog Scale

CONCLUSION

The results of this study found the long-term effect of dry needling helps to reduce anterior knee pain and improve functional capacity which suggests dry needling on rectus femoris is a better treatment option that can last for a long period for patients with anterior knee pain and functional limitation. Further study with a control group with a larger sample size can be conducted for better evidence.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Perry J, Burnfield JM. Gait Analysis: Normal and Pathological Function. 2nd ed. Thorofare, NJ: Slack Incorporated; 2010.
2. Hunter SC, Marascalco R, Hughston JC. Disruption of the vastus medialis obliquus with medial knee ligament injuries. Am J Sports Med 1983;11:427-31.
3. Flandry F, Hommel G. Normal anatomy and biomechanics of the knee. Sports Med Arthrosc Rev 2011;19:82-92.
4. Frigo CA, Wyss C, Brunner R. The effects of the rectus femoris muscle on knee and foot kinematics during the swing phase of normal walking. Appl Sci 2020;10:7881.
5. Sahoo AC, Soumyashree S, Mahapatra C. The role of physiotherapy in the treatment of chronic trigger finger – A case report. Bull Fac Phys Ther 2023;28:27.
6. Navarro-Santana MJ, Valera-Calero JA, Romanos-Castillo G, Hernández-González VC, Fernández-de-Las-Peñas C, López-de-Uralde-Villanueva I, *et al.* Immediate effects of dry needling on central pain processing and skin conductance in patients with chronic

nonspecific neck pain: A randomized controlled trial. J Clin Med 2022;11:6616.
7. Chys M, Bontinck J, Voogt L, Sendarrubias GM, Cagnie B, Meeus M, *et al.* Immediate effects of dry needling on pain sensitivity and pain modulation in patients with chronic idiopathic neck pain: A single-blinded randomized clinical trial. Braz J Phys Ther 2023;27:100481.
8. Stieven FF, Ferreira GE, de Araújo FX, Angellos RF, Silva MF, da Rosa LH. Immediate effects of dry needling and myofascial release on local and widespread pressure pain threshold in individuals with active upper trapezius trigger points: A randomized clinical trial. J Manipulative Physiol Ther 2021;44:95-102.
9. Rodríguez-Mansilla J, González-Sánchez B, De Toro García Á, Valera-Donoso E, Garrido-Ardila EM, Jiménez-Palomares M, *et al.* Effectiveness of dry needling on reducing pain intensity in patients with myofascial pain syndrome: A Meta-analysis. J Tradit Chin Med 2016;36:1-13.
10. Yehoshua I, Rimon O, Mizrahi Reuveni M, Peleg R, Adler L. Dry needling for the treatment of acute myofascial pain syndrome in general practitioners' clinics: A cohort study. BMC Prim Care 2022;23:339.
11. Chys M, De Meulemeester K, De Greef I, Murillo C, Kindt W, Kouzouz Y, *et al.* Clinical effectiveness of dry needling in patients with musculoskeletal pain-an umbrella review. J Clin Med 2023;12:1205.
12. Passigli S, Plebani G, Poser A. Acute effects of dry needling on posterior shoulder tightness. A case report. Int J Sports Phys Ther 2016;11:254-63.
13. Zarei H, Bervis S, Piroozi S, Motealleh A. Added value of gluteus medius and quadratus lumborum dry needling in improving knee pain and function in female athletes with patellofemoral pain syndrome: A randomized clinical trial. Arch Phys Med Rehabil 2020;101:265-74.