

CASE REPORT

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Treatment options for entrapment neuropathy of infrapatellar branch of saphenous nerve post knee arthroplasty: a case report

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Abstract

Background: The infrapatellar branch of the saphenous nerve is highly prone to form a neuroma or undergo transaction after midline incision of knee arthroplasty. The presence of neuroma and entrapment of these fibers can cause pain and numbness/tingling in the knee. The presence of these symptoms can significantly impact rehabilitation outcomes and long-term outcomes.

Case presentation: The patient is a 63-year-old Caucasian female reported to an outpatient orthopedic physical therapy clinic post left knee arthroplasty. The patient reported severe pain (VAS-9/10) with knee range of motion from 5 to 64° flexion. The lower extremity functional score was 42/80 with moderate deficits in function.

Conclusion: The anterior inferior knee pain with saphenous nerve entrapment can cause severe symptoms. Soft tissue mobilizations followed by neurodynamic techniques can improve neural mobility and functional outcomes (LEFS-52/80).

Keywords: Saphenous nerve, Knee arthroplasty, Soft tissue mobilization, Neurodynamic techniques

Introduction

Total knee arthroplasty is the most common surgical procedure performed in the USA after knee osteoarthritis. The midline approach is the most common surgical procedure performed today [1]. The midline incision of post-knee arthroplasty can lead to the entrapment or transaction of the fibers of the infrapatellar branch of the saphenous nerve [2, 3]. The entrapment or transaction can cause paresthesia or anesthesia of the anterior and medial knee with pain and limitation of knee joint range of motion [4–6]. The presence of the neuroma can be extremely painful under the fascia when the patient tries to perform flexion and extension and can affect the

rehabilitation goals and impact long-term goals. Tinel's sign on the saphenous nerve was positive, but the validity and reliability of this test are unavailable in the literature. There has been discussion on performing ultrasound and MRI in the literature, but it was not considered at that time. No literature on saphenous nerve conduction tests is available as an indication after knee arthroplasty [7]. No motor deficits were observed in this patient as it is a pure sensory nerve. The study targets the infrapatellar branch of the saphenous nerve via manual therapy to address anteromedial knee pain to improve functional outcomes. There is literature available to show symptomatic improvement resulting from surgical removal of neuroma [8]. There is limited rehabilitation literature available in addressing the issue; that is why manual therapy can be a boon to patients suffering from symptoms due to infrapatellar neuroma.

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Case presentation

The patient is a 63-year-old Caucasian female (BMI-normal) seen in an outpatient clinic post left knee arthroplasty (2 weeks). The patient-reported considerable medial knee pain (VAS-9/10) with active knee range of motion testing. The range was restricted from 5° of flexion to 64° of flexion, with the patient demonstrating an antalgic gait pattern [9]. The X-rays and ultrasound performed post-knee arthroplasty were negative for prosthetic alignment and deep vein thrombosis. The patient denied any low back, hip, and ankle pain but demonstrated extreme tenderness to palpation in the anteromedial knee [10]. The surgical site of the incision was closed, and the wound edges were approximated and were not tender to palpation. Tinel's sign performed on the saphenous nerve reproduced the symptoms of numbness/tingling and severe pain in the anteromedial knee with radiation to inferior patellae. The functional outcome scales showed 42/80 (lower extremity functional scales) with difficulty in most functional activities. Due to extreme anterior-medial knee pain, the patient showed reluctance to rehabilitation and exercises. Soft tissue mobilizations such as deep friction to the palpable neuroma and neurodynamic flossing techniques targeting saphenous demonstrated significant improvement [11, 12] (Figs. 1 and 2). This approach was followed by gradual active, and passive rehabilitation focused on improving range of motion, strength, and joint mobility during the same visit (Figs. 1 and 2).

After two appointments (VAS-1/10) of soft tissue mobilizations and neuro-dynamic flossing techniques,



Fig. 1 Self-mobilization to left saphenous nerve-patient in standing position with rear foot in eversion (left side). The patient is trying to lunge (right side) and side-flex the spine on the leading foot till the patient feels the slight tension on the left medial knee. The patient moves back and forth between these two positions. **Images are taken with consent and written permission provided



Fig. 2 Deep friction tissue mobilization performed perpendicular across the palpable neuroma. **Images are taken with consent and written permission provided

the patient showed significant improvement in anteromedial knee symptoms. Soft tissue mobilization was performed perpendicular to the saphenous neuroma for 5 min and 6 min, respectively, during the 1st and 2nd visits. The dosage of soft tissue mobilization was performed considering the patient's tolerance levels. The saphenous flossing was conducted in the mid-range for 2 min each without aggravating the symptoms. Tensioning techniques were not tried considering the acuteness of symptoms. The re-evaluation was performed on the 8th visit after 4 weeks of biweekly appointments. The 4-week follow-up demonstrated an improved range of motion from 0 to 94° of flexion with functional outcome scale improving to 52/80 [13] (lower extremity function scale).

Discussion

Knee arthroplasty is a standard surgical procedure, and the neuroma associated with it can be missed by physicians, surgeons, and therapists. The presence of neuroma and entrapment of nerve fibers under the fascia can produce intense pain in patients with post-knee arthroplasty and delay rehabilitation goals. The surgical approach has been shown to demonstrate improvement in symptoms but is rarely used after knee arthroplasty [8]. Rehabilitation modalities like soft tissue mobilizations to the fascia and neurodynamic techniques like flossing can reduce tissue adhesions and facilitate neural mobility [13]. Flossing techniques have been found to improve longitudinal excursion and produce mechanical effects on neuropathological processes [14]. For example, the flossing techniques on the median nerve have been shown to increase the length by 30%, with the average excursion of 12.6 mm greater than the tensioning method. These

effects at the molecular level can improve neurotrophins such as nerve growth factors (NGF) and myelin protein zero (MPM) [15]. In addition, these effects can produce high numbers of axons possessing myelin sheaths of average thickness and less inter-axonal fibrosis, thus improving signs of regeneration [15]. When flossing techniques are combined with scar tissue mobilizations, it facilitates the regenerative process by decreasing neural compression, reducing nerve adherence, dispersion of noxious fluids, increasing neural vascularity, and improving axoplasmic flow [16]. The resolution of pain by improving neural mobility and increasing excursion early in the rehabilitation can facilitate active and passive rehabilitation progression. The study did not conduct a 6-month or 1-year follow-up due to insurance limitations to assess long-term outcomes. More follow-up studies and randomized control trials are needed to study the effects of these interventions on long-term outcomes.

Conclusions

It is imperative to manage pain post knee arthroplasty. The infrapatellar branch of the saphenous nerve is prone to entrapments and neuromas. The specific techniques targeting the neural tissue can provide early resolution from severe pain symptoms. It is vital to address these tissue dysfunctions for successful long-term outcomes.

Patient perspective informed consent

The patient gave verbal and written consent to participate in the study. The patient reported that addressing soft tissue mobility and nerve flossing (in the clinic and at home) significantly improved her symptoms in the first week of rehabilitation. In addition, the patient reported that she could perform the exercises with little difficulty after the resolution of severe pain post knee arthroplasty.

Abbreviation

VAS: Visual analog scale.

Acknowledgements

I provide sincere thanks to the patient for giving consent to participate in the case report. I also would like to thank Dr. Kumar for his help in writing this case report.

Authors' contributions

TS provided the interventions to the patient in the case study. TS and PK wrote the main manuscript. The authors have read and approved the manuscript.

Funding

Nil.

Availability of data and materials

Available.

Declarations

Ethics approval and consent to participate

Written consent was given to participate, and all images were taken with verbal/written permission.

Consent for publication

All patients included in this research gave written informed consent to publish the data contained within this study. If the patient was less than 16 years old, deceased, or unconscious when consent for publication was requested, written informed consent for the publication of this data was given by their parent or legal guardian.

The research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside the research context. For example, minimal risk research that involves surveys/interviews conducted via telephone or online.

Competing interests

The authors declare that they have no competing interests.

Received: 22 July 2021 Accepted: 14 January 2022

Published online: 09 March 2022

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