Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Physiotherapy

Unlocked Knee Syndrome: An Unnoticed form of Knee Pain

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DOI: 10.36347/sjmcr.2023.v11i11.001 | **Received:** 19.09.2023 | **Accepted:** 25.10.2023 | **Published:** 03.11.2023

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Abstract **Case Report**

Introduction: A ligament tear or torn cartilage are two examples of injuries that can cause knee pain. Medical conditions like gout, arthritis, and infections can also cause knee pain. The existence of knee pain is a better predictor for any stuctural alterations in the knee joint. ***Case Report:*** Having undergone a right knee arthroscopy 15 years prior for knee pain related to an ACL injury, a 46-year-old man presented our department with intermittent right knee discomfort that had been persistent for four months. The patient's primary regions of pain include the area over the right shin, the medial and lateral portions of the right tibia, as well as the medial patellar region. The patient's knee pain made it challenging for him to carry out daily tasks like walking, squatting, and climbing stairs. ***Conclusion:*** This is a unique case presentation of chronic knee-unlocking syndrome followed by an ACL injury. Other symptoms and indicators that the patient complains about are secondary biomechanical changes and adaptations brought on by his unlocked knee posture.

Keyword: Knee pain, Iliotibial band syndrome, Pesanserinus tendinitis, Anterior tilted pelvis, Unlocked knee syndrome.

INTRODUCTION

Knee discomfort is regularly reported by people of all ages. A ligament tear or torn cartilage are two examples of injuries that can cause knee pain. Medical conditions like gout, arthritis, and infections can also cause knee pain. Knee pain accounts for a sizable share of visits to medical professionals and is a major cause of functional limitations and impairment in people of all ages. Even though chronic knee pain in older people is typically attributed to progressive and degenerative joint changes associated with knee osteoarthritis, functional limitations in the knee pain patient population do not appear to be a necessary result of degenerative structural changes or disease severity. In order to understand this, it has been argued that the existence of knee pain is a better predictor for any stuctural alterations in the knee joint.

CASE REPORT

In the PhysX (an advanced unique physiotherapy) department of Trust Multispeciality Hospitals in Andhra Pradesh, India, this case report was witnessed and given with institutional ethics committee permission. Having undergone a right knee arthroscopy 15 years prior for knee pain related to an ACL injury, a 46-year-old man presented our department with intermittent right knee discomfort that had been persistent for four months. The patient's primary regions of pain include the area over the right shin, the medial and lateral portions of the right tibia, as well as the medial patellar region. The patient's knee pain made it challenging for him to carry out daily tasks like walking, squatting, and climbing stairs. We examined his right lower limb and found the following: The foot arch is diminished, the foot is pronated, the tibia is internally rotated, the knee is slightly valgus, severe popliteus tenderness, pain in the greater trochnatric region, outflared-upslipped with anterior tilted pelvis (Fig-1). Tenderness and tightness over the gluteal maximus, tensor fascia lata, gracilis, semitendinosis, sartorius, and Vastus medialis oblique (VMO). Erector spinae, multifidus, and ilio-psoas tightness. Weak abdominal, gluteal, and hamstring muscles.

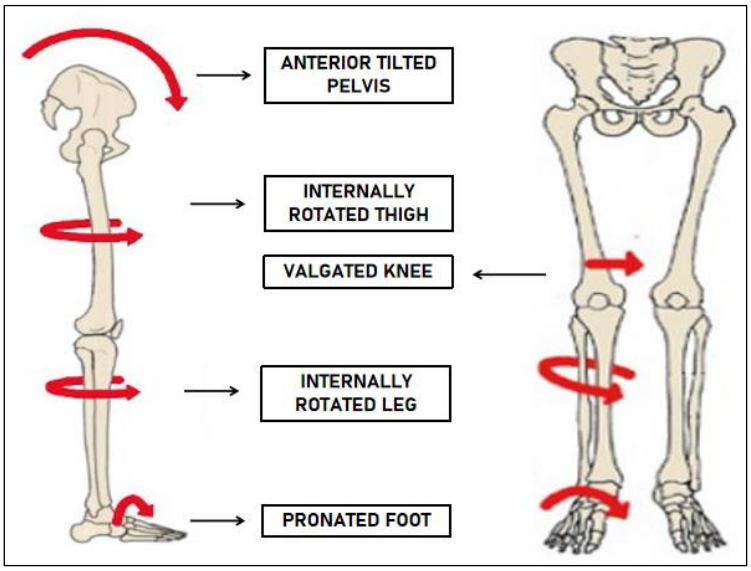

Figure 1: Schematic illustration of the biomechanical changes brought on by unlocking knee syndrome in the right lower limb

DISCUSSION

The knee joint is held in place by two types of structures: primary and secondary stabilizers. The primary stabilizers are the ligaments inside the knee joint, which help keep everything in place. The secondary stabilizers are the muscles around the knee, which support and reinforce the ligaments' work. During movement, these muscles contract involuntarily to provide additional support to the knee joint. This is important because during motion, there is a risk that the ligaments may be stretched or damaged. Therefore, having strong muscles around the knee helps protect against injury and allows for reliable function of this joint. To achieve this dynamic reinforcement of tendons (which connect muscles to bones), involuntary muscle contractions occur during motion to assist with stability provided by ligaments. During flexion and extension, the knee bones can be seen rotating called screw home mechanism (SHM). The screw home mechanism (SHM) of the knee joint is a crucial mechanism that influences the knee's final extension. The proper mobility of the knee depends on this rotation. The tibia (open chain) or femur (closed chain) must externally or internally rotate by approximately 10 degrees, respectively, during the final 30 degrees of knee extension. The unevenness of the articular surface of the femur condyles is the cause of this small rotation. Rotation requires to achieve full extension, and also followed by flexion after full extension [1-6]. In closed kinematic chain, the medial rotation of the femur on the tibia during the final 30 degrees of knee extension keeps the joint tight and packed. By the lateral rotation of the femur, the knee is released from locking. During the final 05 degrees of Extension in an open kinematic chain, the Tibia rotates laterally on the Femur to create locks. By rotating the medial, it unlocks.

The knee joint is in highly stable position when it is locked. Any ligament injury in the knee occurs mainly in loosed-pack (unlocked) position. With open chain actions, the popliteus unlocks the knee. The popliteus acts to internally rotate the tibia on the femur during the open-chain phase or swing phase of the limb. It involved the unlocking screw-home movement of the knee joint [7]. With closed chain motions, the hip external rotators assist in unlocking the knee [8]. The gluteus maximus, gluteus medius, gluteus minimus, and tensor fasciae latae make up the large hip external rotator muscles. The strongest external rotator muscle of the hip is located in the buttocks and is called the gluteus maximus. The short external rotators of the hip joint are five muscles that are located in the deep gluteal area. They consist of the quadratus femoris, piriformis, superior and inferior gemelli, as well as the obturator internus. Foot pronation and supination did not have a significant relationship with pelvic tilt and lumbar lordosis. Internally rotating the legs caused the pelvis to tilt anteriorly and increased lumbar lordosis and externally rotating the legs caused the pelvis to tilt posteriorly with diminished lumbar curvatures. Pes Planus is a condition that affects the arch in the middle of our foot, causing it to decrease or disappear. This can happen with pronated foot, which means that the tibia bone is rotated inward more than it should be. When this happens, other parts of your body try to compensate for the misalignment by adjusting their position. For example, the pelvis will tilt forwards and outwards while the femur bones will rotate inward. However, these compensations can cause further problems. If the femur bones are already internally-rotated and they continue to turn inward due to the pronation of the foot, this can lead to knee valgus - meaning that the knees collapse inwards instead of staying straight.

The patient's previous history of ACL injuries, which occurred 15 years ago, is a direct cause of his current complains and difficulties. The ligament injury occurred on his knee joint while it was in a loose pack or unlocked state, even though the ACL injury may recover at this point. The popliteus muscle may have been forced into a strong, involuntary contraction as a result of the external force that caused the injury. The protectively spasmed popliteus muscle was not attempted to be relaxed or loosened, or it has not fully recovered from its protective spasm. For a lengthy 15 years, this involuntary-forceful contracted popliteus has kept the knee in the unlocked position by being in a protective spasm state. The stability factor of this chronically unlocked joint mainly depends only on its secondary stabilizers, like the muscles around the knee joint. Due to his popliteus's persistent tightness, the patient's tibia is internally rotated when he presents. He has a pronated foot and a low foot arch, which contribute to his shin pain in addition to the internal rotation of the tibia. Pes-anserinus tendinitis and Ilitibial Band Syndrome (ITBS) are to blame for the medial and lateral components of knee discomfort, which result in tenderness and tightness across the gluteal maximus, tensor fascia lata, gracilis, semitendinosis, and sartorius. The iliotibial band bursa, which surrounds the larger trochnatric region, can become inflamed and cause pain in this area as well. Vastus medialis oblique (VMO) tightness results from this muscle's effort to maintain the knee's locking posture to maintain the stability. Vastus medialis oblique (VMO) and medial patellar retinaculum tightness is the cause of pain in the vicinity of the medial patellar area. His pelvis outflares and upslipped with the anterior tilted due to the secondary alterations in the pelvis brought on by the limb internal rotation presentation. Secondary consequences of misplaced pelvic bones include tightness of the Erector spinae, multifidus, and ilio-psoas and weakness of the abdominal, gluteal, and hamstring muscles.This is a unique case presentation of chronic knee-unlocking syndrome followed by an ACL injury. Patient complains; other signs and symptoms are secondary biomechanical modifications and adaptations that happened due to his unlocked knee position.

CONCLUSION

The right lower limb's complete functional recovery is the main goal of the patient's treatment plan. The treatment plan includes the following: (i) *Biomechanical Corrections:* An orthotic device will correct the incorrect foot position, regulate the angle of the forefoot-to-rearfoot connection during the whole gait cycle, and permit only a normal range of pronation at the appropriate time. This ensures normal and balanced loading through the lower limb. Our licensed physiotherapist performed a comprehensive biomechanical analysis in order to suggest an ideal and suitable orthotic device for the foot and offer guidance on proper acclimatization. (ii) *Myofascial Release:* Because of the abnormal loading (weight-bearing) on the lower leg, the soft tissue will adjust and become adhesive, inflamed, and tight. Hands-on deep tissue massage was performed by our physiotherapist to loosen and reabsorb adhesions, realign scar tissue, lessen muscular spasms, and relieve muscle rigidity. As a result, the muscles become softer and more flexible. (iii) *Joint mobilisation:* A stiff and inflamed joint is a result of the microtrauma that occurs at joints as a result of abnormal stress. Our therapist mobilizes or manipulates the joint to loosen up adhesions around it and increase its range of motion. (iv) *Cryo / heat therapy:* Ice reduces blood flow to a joint or soft tissue structure, which reduces inflammation, effusion, and edema there. Heat will make the area feel warmer and looser by increasing blood flow to the joint or soft tissue, which will introduce new cells for healing and repair. Our physiotherapist advises regarding the correct times to use ice and heat for respective injury. (v) *Activity modification and programmed rehabilitation process:* To allow the inflammation around the affected area to subside, training or regular activities may need to be modified. Our skilled therapists may offer alternative, non-aggravating training plans to make sure patients give the injured area time to recover before returning to their regular activities after an individualized rehabilitation program. *(vi) Conditioning and Strengthening:* To correct any muscular imbalance or weakness brought on by the biomechanical anomaly, our therapist recommended a customized strength and conditioning program. This will aid in reducing the risk of further injuries. The ability of the patient to perform terminal (end-range) knee extension during activities of daily life is our major treatment objective [8].

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