ISSN 0008-3194 (p)/ISSN 1715-6181 (e)/2022/157–171/$2.00/©JCCA 2022

Meniscal lesion or patellar tendinopathy? A case report of an adolescent soccer player with knee pain

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Background: *Injuries to the meniscus are particularly prevalent in soccer players, with an incidence of 0.448 injuries per 1000 hours of playing. However, in the adolescent soccer player population, it has been reported that up to 63% of asymptomatic knees may demonstrate horizontal or oblique tears on MRI. These results may negatively influence clinical decision-making and plan of management for adolescent soccer players with knee problems.*

Case presentation: *A case of a 15-year-old soccer player is presented after having been diagnosed by his family physician with a left lateral meniscus tear as per MRI, following a 10-week period of anterior knee pain. He presented to a chiropractor for a second opinion before consulting with the orthopedic surgeon.*

Management and outcome: *Recommendations*

Lésion du ménisque ou tendinopathie de la rotule? Étude du cas d'un joueur de soccer adolescent souffrant d'une douleur au genou

Contexte : *Les lésions du ménisque sont particulièrement fréquentes chez les joueurs de soccer, présentant une incidence de 0,448 lésion pour 1 000 heures de pratique. Toutefois, on observe par IRM chez les joueurs de soccer adolescents que jusqu'à 63 % des genoux asymptomatiques peuvent présenter des déchirures horizontales ou obliques. Ces résultats peuvent nuire à la prise de décisions cliniques et à la planification du traitement des joueurs de soccer adolescents souffrant de problèmes au genou.*

Exposé du cas : *Un joueur de soccer de 15 ans a consulté son médecin de famille qui a diagnostiqué par IRM une déchirure du ménisque latéral gauche, après avoir ressenti une douleur de la partie antérieure du genou pendant dix semaines. Il a obtenu un deuxième avis auprès d'un chiropraticien avant de consulter un chirurgien orthopédiste.*

Traitement et résultat : *Une réadaptation progressive*

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The author has no disclaimers, competing interests, or sources of support or funding to report in the preparation of this manuscript. The involved patient provided consent for case publication.

for progressive rehabilitation owing to the lack of clinical evidence for meniscal abnormality were made. A primary diagnosis of left patellar tendinopathy was determined and after a 6-week comprehensive rehabilitation program, the patient made a complete recovery.

Summary: *A thorough history, physical examination, and understanding of the patient's injury mechanism are suggested before confirming/refuting suspicions of meniscal abnormalities via MRI. This will help to inform better clinical decision-making as well as decrease the occurrence of unnecessary imaging.*

(JCCA. 2022;66(2):157-171)

KEY WORDS: chiropractic, meniscal tear, physical examination, diagnosis, rehabilitation, patellar tendinopathy, magnetic resonance imaging, adolescent, soccer

a été recommandée en raison du manque de données cliniques probantes d'une anomalie du ménisque. Un diagnostic initial a permis de déterminer une tendinopathie de la rotule gauche et après un programme de réadaptation complet de six semaines, le patient avait entièrement récupéré.

Résumé : *Il est conseillé de procéder à une anamnèse poussée, de réaliser un examen physique et de comprendre le mécanisme de la lésion du patient avant de confirmer ou d'infirmer toute suspicion d'anomalies du ménisque par IRM. Cela permettra d'éclairer la prise de décisions cliniques et d'éviter de recourir à l'imagerie inutile.*

(JCCA. 2022;66(2):157-171)

MOTS CLÉS : adolescent, chiropratique, déchirure du ménisque, diagnostic, examen physique, imagerie par résonance magnétique, réadaptation, soccer, tendinopathie de la rotule

Introduction

Soccer is the most popular sport in the world, with nearly 129,000 athletes competing professionally and over 220 million playing recreationally worldwide.[1] Injuries to the meniscus are particularly prevalent in soccer players, with an incidence of 0.448 injuries per 1000 hours of playing.[2] The sport-specific demands for quick cutting, pivoting, and tackling render these athletes particularly susceptible to meniscal tears.

MRI is widely used for assessing meniscal tears. Many MRI studies have documented the high accuracy rates of detecting knee pathology.[3-8] A meta-analysis based on 22 studies described an overall sensitivity of 88% and specificity of 94% for detecting meniscal lesions.[9] Consequently, MRI results may affect the treatment of patients with knee problems.[4,10] It has been demonstrated that there is a baseline prevalence of meniscal tears in asymptomatic knees.[11-13] Depending on the patient's age, a prevalence of up to 36% has been reported in the general population.[12] Particularly in the adolescent soccer player population, it has been reported that up to 63% of asymptomatic knees may demonstrate horizontal or oblique tears on MRI.[14] One study reported that high signal within the meniscus may be found in 80% of asymptomatic menisci in 10-year-olds, decreasing to 35% in 15-year-olds.[15] Yet another study of 51 children with suspected meniscal pathology found a sensitivity and specificity of 50% and 78% respectively for lateral meniscal tears in the under 15 age group.[16] A low positive predictive value (20%), but a high negative predictive value (93–100%) of MRI for meniscal tears was determined.[16] A high prevalence of abnormal findings in asymptomatic knees hampers the value of any imaging method in clinical decision making.[17] It is therefore of fundamental importance that MRI findings are not used in isolation, as it may negatively influence clinical judgement and decision-making, especially in the pediatric/adolescent population.

It has been suggested that clinical examination, performed by an experienced examiner, can have equal or even more diagnostic accuracy compared to MRI to evaluate meniscal lesions.[18] In one study, the overall accuracy for the clinical diagnosis of meniscal tears was 80.7% and the corresponding accuracy for MRI was 73.7%.[19] In yet another study, clinical examination performed by an experienced knee surgeon was observed to have better specificity (90% vs. 60%), positive predictive value (95% vs. 83%), negative predictive value (90% vs. 86%), and diagnostic accuracy (93% vs. 83%) than MRI for medial meniscal tears.[20] These parameters showed only a marginal difference in lateral meniscal tears.[20] These results would suggest that clinical examination by an experienced examiner using multiple meniscus tests is necessary for the diagnosis of a clinically relevant meniscal tear.[20]

The purpose of this case report is to highlight the importance of using clinical information to inform clinical judgement and decision-making, while using MRI in conjunction to help confirm clinical suspicions, and not as a sole diagnostic tool. It is fundamental to correlate clinical information with relevant MRI findings, as incidental imaging findings may be present without clinical symptomatology or implications. This will help to determine the appropriate plan of management in adolescent knee injuries.

Case presentation

A 15-year-old, right-foot dominant, male competitive soccer player presented to a chiropractor complaining of left anterior knee pain at the distal pole of the patella as well as the distal quadriceps tendon, most apparent to the patient with intense exercise and specific movements, such as decelerating from a run and quick directional changes/cutting while playing soccer. Ten weeks prior to his visit to the chiropractor, the patient had injured his left knee in a competitive match. With his back facing goal, he had received the ball, turned, and was tackled from the left side, with the opposing player making forceful contact from the lateral aspect of the left knee to collapse into valgus. No audible noises were heard. The patient was subsequently taken off for five minutes, then returned to play and was able to finish the game with some pain in the knee. No bruising, swelling, give-way sensations, or audible clicks/crunching at the knee was reported by the patient following the match. The patient continued attending training sessions for the following six weeks after the incident occurred, although continuing to experience anterior knee pain. The patient had sought physiotherapy treatment during this time, which was completely passive in nature. The physiotherapist determined a diagnosis of meniscal irritation of the left medial and lateral menisci. The patient reported having been treated with laser and IFC treatment two times a week for four weeks, however with no change in symptoms. After the six weeks, there was a two-week break from training and competition with the club, during which the patient was not playing soccer at all. Following this break period, training resumed and on the first day of return during a scrimmage, the patient noticed severe difficulty in producing any sort of left knee extensor force during the entire session. He described the knee as being "slow", with difficulty pushing off the left foot during running and cutting, as well as a very low force-production in left-footed kicking with limited mobility. No clicking, give-way, or locking sensations were reported by the patient.

The patient then sought the opinion of his family physician and was subsequently referred for radiographic and MRI studies. Radiographic imaging was unremarkable. However, the MRI findings reported a subtle suspected nondisplaced oblique tear of the posterior horn of the lateral meniscus, extending to the tibial plateau (Figure 1). The patient was subsequently referred for orthopedic consult but had sought the opinion of the chiropractor before meeting with the orthopedic surgeon.

Upon presentation to the chiropractor, the patient reported left anterior knee pain that was dull and achy in nature, but sometimes very sharp with higher intensity movements (5/10 at rest, 8/10 during activity using the Numeric Pain Rating Scale (NPRS)), such as running, jumping, cutting, and deceleration from running. The left quadriceps measured 40.8 cm, compared to 41.5 cm on the right (measured 4 cm above the patella). There was no swelling apparent on either the medial or lateral aspect of the patella, or at the tibial tuberosity. The patient was unable to squat beyond 50 degrees of knee flexion due to increasing pain and pressure around the patella. Slight bilateral knee valgus was also noted during descent of the squat beginning at 20 degrees. Meniscal orthopaedic testing was negative, including Thessaly's test, McMurray's test, Steinman's test, and joint line tenderness. Ligamentous laxity tests of the knee were also negative bilaterally. Thomas test revealed quadriceps tightness bilaterally (knee flexion at 120 degrees on both left and right tests), with hip flexor tone within normal limits. Upon palpation, tenderness was present at the mid-portion of the left patellar tendon (8/10 NPRS) with moderate tenderness at the inferior pole of the left patella (5/10 NPRS) and distal quadriceps tendon (4/10 NPRS). These all reproduced the patient's chief complaint. Bilateral kneeling was particu-

Figure 1.
Left knee MRI frames (Sagittal FSE PD and intermediate weighted FS) demonstrating a nondisplaced oblique tear of the posterior horn of the lateral meniscus, extending to the tibial plateau.

larly painful on the patient's left knee (8/10 NPRS) and resisted left knee extension reproduced the chief complaint. A left patellar compression test was also found to be positive.

Upon review of the patient's clinical presentation, history, physical evaluation, and MRI findings, the chiropractor determined that the left lateral meniscal tear found in the advanced imaging study was, in fact, not clinically relevant and may very well have been an incidental asymptomatic finding, as the clinical picture did not correlate at all with the imaging findings. The differential diagnoses made by the chiropractor included left-sided patellar tendinopathy, left quadriceps tendinopathy, left patellofemoral pain syndrome, left iliotibial band syndrome, and left Hoffa's fat pad syndrome. There was no MRI evidence to suggest Sinding-Larsen-Johansson disease or Osgood-Schlatter syndrome as differentials at this time. This clinical impression was later confirmed by the orthopedic surgeon during the patient's first orthopedic consult later that week. The orthopod had recommended against any sort of invasive meniscal procedures, but had instead advised on a plan of conservative care with the chiropractor.

In accordance with the orthopedic surgeon's recommendations, the patient began a six-week (three sessions a week) progressive rehabilitative return-to-play program at the chiropractic clinic, which included a gradual reintegration into training sessions with his soccer club in the later phases of the program. The protocol consisted of a progressive routine of supervised exercises and manual therapy (soft tissue therapy), with detailed focus on enhancing tibiofemoral/patellofemoral range of motion, hip and ankle control/mobility, increasing load and extensibility capacities of the extensor mechanism, and eventually training the dynamic/ballistic capacities of the rehabilitating anatomical structures to be able to perform in an athletic environment. Checkpoints were met along the course of the rehabilitative program. The entire rehabilitation protocol is outlined in Table 1. Education was also provided along the way, such as technical instruction to reduce valgus stress during squatting, as well as supportive nutritional considerations, like increasing

Table 1.
Rehabilitation program

Rehabilitation Phase	Week	Exercises	Checkpoint
Range of Motion Phase	Week 1 (Exercises done twice per day)	1. Heel Slides (20 reps x 3 sets) 2. Rotational Tibiofemoral CAR's (10 reps x 3 sets) 3. Hip CAR's (5 reps both ways) 4. Ankle CAR's (10 reps both ways)	✓ Full, non-loaded tibiofemoral range of motion achieved, without pain
Isometric Phase	Week 2 (3 supervised sessions in one week)	1. 30, 90, and 120 Degree Wall Sits (10 seconds each x 3 sets) 2. Double and Single Leg Hamstring Bridges (10 seconds each x 3 sets) 3. Isometric Lunges (10 seconds each leg x 3 sets) 4. Deep Squats (30 seconds x 3 sets)	✓ Exercises performed pain-free and with full range of motion
Eccentric Phase	Week 3, 4, and 5 (3 supervised sessions in the first week, then 2 the next week, and 1 session the following week)	1. 25 Degree Decline Squats (10 reps x 3 sets) 2. Eccentric lunges (10 reps each x 3 sets) 3. Reverse Nordic Curls (10 reps x 3 sets) 4. Nordic Hamstring Curls (10 reps x 3 sets) 5. Single Leg Russian Deadlifts (10 reps x 3 sets)	✓ Exercises performed with minimum 5-second descents with good control, no pain, and full range of motion.
Dynamic Phase	Week 4, 5, and 6 (1 supervised session the first week, then 2 the next week, and 3 sessions the following week)	1. Double Legged Hops (forwards and lateral, 10 reps x 3 sets) 2. Single Legged Hops (forwards and lateral, 10 reps x 3 sets) 3. Forward Running Bounds (10 reps x 3 sets) 4. Skier Jumps (10 reps x 3 sets) 5. 24 Inch Box Jump/Lands (double leg – 10 reps x 3 sets, single leg – 6 reps x 3 sets) 6. 36 Inch Box Jumps/Lands (double leg – 6 reps x 3 sets) 7. Kneel Jumps (6 reps x 3 sets) 8. Sprints (6 reps of 10 seconds, full intensity) 9. Acceleration/Deceleration Runs (forwards and side-on, 6 reps) 10. Figure 8 Runs (6 reps)	✓ Ability to perform all dynamic movements pain-free

protein intake to five servings of 20 grams of protein per day.[21-23]

The rehabilitation protocol began with regaining complete tibiofemoral range of motion, as well as enhancing the mobility/control of the hip and ankle. The patient was prescribed heel-slides (Figure 2 – 20 repetitions by three sets) and rotational tibiofemoral controlled articular rotations (CAR's) (Figure 3 – 10 repetitions by three sets) to be completed a minimum of two times daily. Hip (Figure 4 – five repetitions clockwise and counterclockwise) and ankle (Figure 5 – 10 repetitions clockwise and counterclockwise) CAR's were also prescribed to be completed concomitantly twice daily, at a minimum. Full, non-loaded tibiofemoral range of motion was achieved after one week, with no pain.

Figure 2.
Heel slide exercise used to enhance flexion/extension range of motion of the tibiofemoral joint as well as to begin recruiting hamstring and quadricep activation. The patient A) slides their heel as close to the buttock as possible, then B) straightens into full knee extension and repeats.

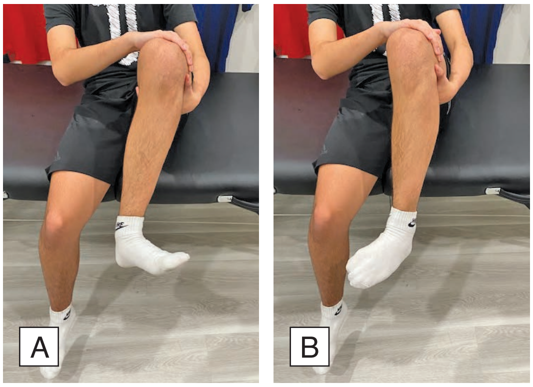

Figure 3.
Rotational tibiofemoral controlled articular rotations (CAR's), used to enhance tibiofemoral range of motion and neurogenic control in the transverse plane. The patient stabilizes their femur with their hands while focusing on A) laterally and B) medially rotating the tibia.

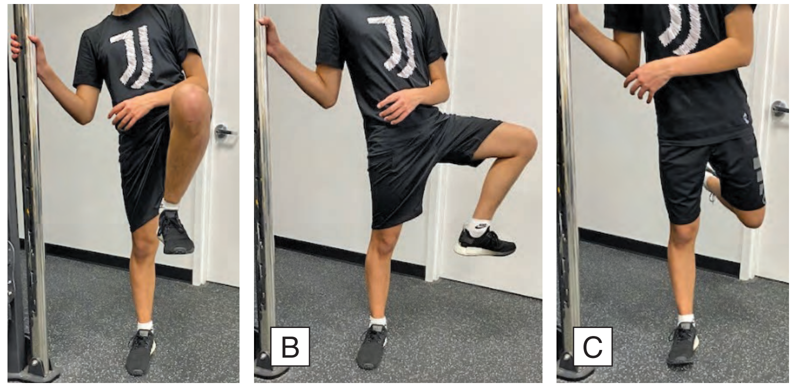

Figure 4.
Hip controlled articular rotations (CAR's), used to enhance neurogenic control of the hip musculature as well as range of motion of the acetabulofemoral joint. The patient begins by A) flexing the hip as much as possible, then B) abducting laterally, and at end range C) rotating internally while simultaneously extending and abducting the hip. The patient then returns in the opposite direction to complete one full CAR cycle.

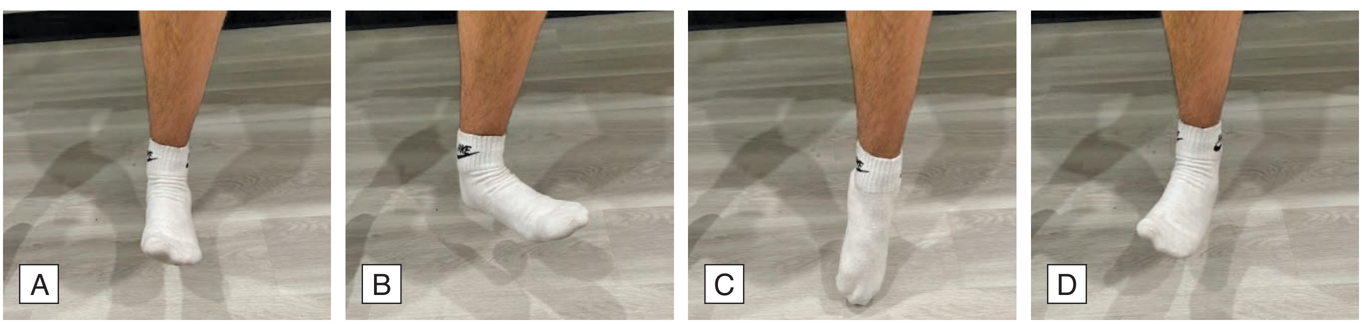

Figure 5.
Ankle controlled articular rotations (CAR's), used to enhance neurogenic control and range of motion of the ankle mortise. The patient performs full circles in both clockwise and counterclockwise directions with the ankle using combinations of A) dorsiflexion, B) external rotation, C) plantarflexion, and D) internal rotation.

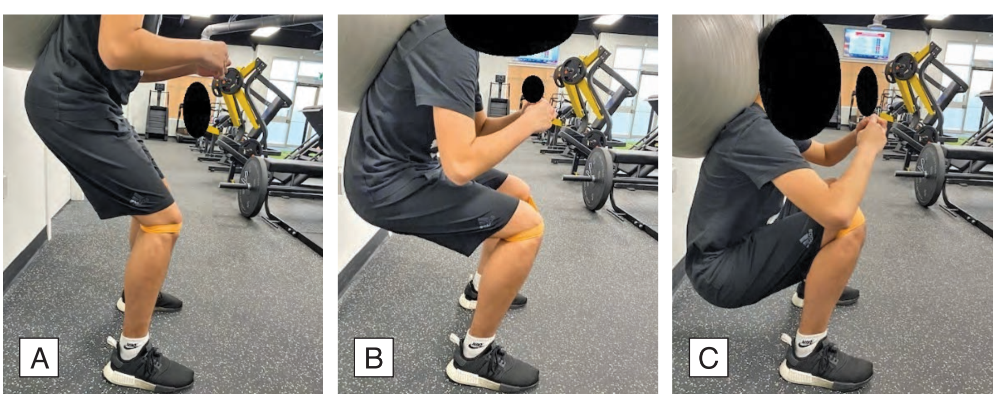

Figure 6.
Isometric wall sits (with band) performed at A) 30, B) 90, and C) 120 degrees of knee flexion. The squat is used to begin strengthening the knee extensors in different orientations while the band around the knees cues the patient to externally rotate both hips so that knee valgus is decreased.

Figure 7.
Isometric hamstring bridge performed with A) double and B) single legs. This exercise is used to strengthen the hamstring, which helps to stabilize the knee.

Figure 8.
Isometric lunges (with band) used to strengthen the quadriceps while cueing the patient (with the band) to externally rotate the hip to reduce knee valgus.

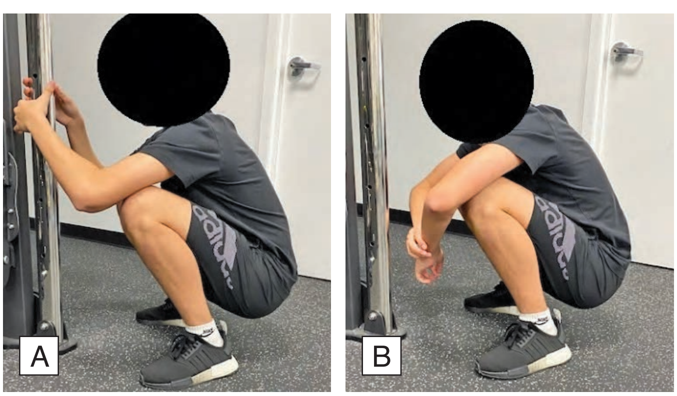

Figure 9.
Deep isometric squats performed A) with and B) without support column. This exercise is used to challenge hip, knee, and ankle mobility/range of motion.

Once this checkpoint was reached, the isometric strengthening phase of the rehabilitation program was added. The patient was prescribed wall sits (Figure 6 – three sets) at 30, 90, and 120 degrees of knee flexion to be held for 10-second intervals with breaks in between. An exercise band was placed around both knees to elicit gluteal abductor activation. Hamstring bridges (Figure 7 – three sets) were also prescribed to be held for 10-second intervals, performed with both legs and single legs. Isometric lunges (Figure 8 – three sets each leg) were prescribed and held for 10-second intervals, with an exercise band around the front knee to produce a valgus force, challenging the gluteal abductors to contract. Finally, the patient was prescribed deep squats (Figure 9 – three sets) to be held for 30-second intervals. At first, the patient would hold on to a column for support, but was encouraged to slowly begin supporting his own body weight, and eventually moving the body in clockwise and counter clockwise circles while maintaining the deep squat. This rehabilitation phase lasted one week, as all the respective exercises were able to be performed pain free and at full range at this checkpoint.

The next phase of rehabilitation was the eccentric loading phase. The patient was prescribed eccentric 25 degree decline squats (Figure 10 – single and double leg), eccentric lunges, reverse Nordic curls (Figure 11), Nordic hamstring curls (Figure 12), and single leg Russian deadlifts (Figure 13). These exercises were to be repeated 10 times for three sets, with special focus on taking at least five seconds to descend eccentrically into the bottom position for all exercises. As certain exercises became less challenging, resistance would be added to these exercises to create additional difficulty. The eccentric exercises were maintained throughout the rest of the protocol, however gradually eliminated. The first week of this rehabilitation phase contained eccentric sessions during the week, brought to two sessions the following week, then one the next, and zero in the last week of the protocol. As eccentrics were phased out, the dynamic/ballistic portion of the rehabilitation protocol was phased in.

The dynamic/ballistic portion of the protocol was progressively phased over the final three weeks of the program, beginning with one session in the first week, then two sessions the following week, and three sessions in the last week of the protocol. All sessions began with a FIFA 11+ warmup lasting 10 to 15 minutes.[24] The first ses-

Figure 10.
Eccentric 25 degree decline squats. The patient descends slowly into the squat to tension and lengthen muscular and tendinous knee extensor structures.

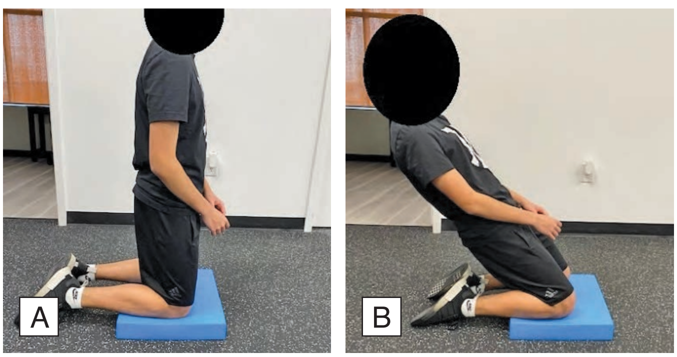

Figure 11.
Reverse Nordic quadricep eccentrics. The patient A) begins in a kneeling position and B) descends slowly backwards as far as possible, maintaining a straight torso and thigh line. This is an eccentric exercise used to tension and lengthen muscular and tendinous knee extensor structures.

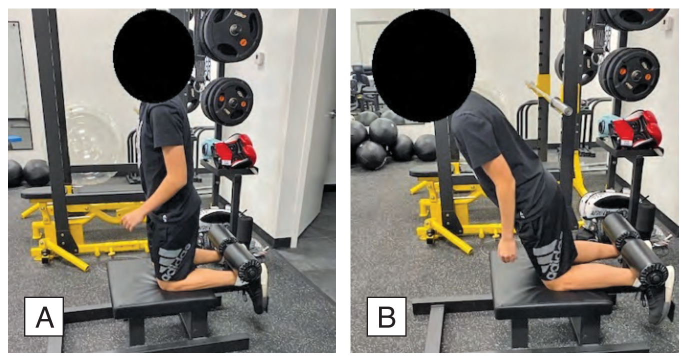

Figure 12.
Nordic hamstring eccentric curls. The patient A) begins in a kneeling position and B) descends slowly forwards as far as possible, maintaining a straight torso and thigh line. This is an eccentric exercise used to tension and lengthen muscular and tendinous knee flexor structures.

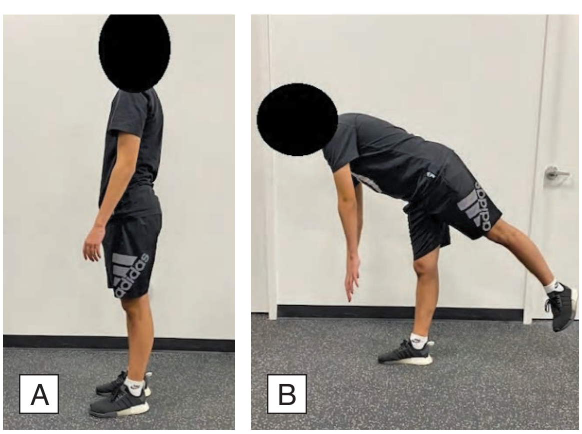

Figure 13.
Eccentric single leg Russian deadlift. From A) the starting position, B) the patient balances on one leg while C) descending slowly forward, maintaining level hips and as straight of a torso-leg line as possible. This is an eccentric exercise used to tension and lengthen muscular and tendinous proximal hamstring structures.

sion included a reintroduction to double legged hops and bounds in all orientations, with emphasis on very little ground contact time. Repetitions of 10 for three sets were used for each orientation, including forwards/backwards, lateral, and diagonals (Figure 14). A 10-minute treadmill jog was also reintroduced. Following the first session, single leg hops and bounds were reintroduced including all orientations mentioned previously for the double legged hops (Figure 15 – 10 repetitions for three sets). Single leg forward running bounds (Figure 16) and skier jumps (Figure 17) were added, consisting of 10 repetitions for three sets. As these bounds became easier to perform, box-jumps/lands (Figure 18 – 10 repetitions double legged, six repetitions single legged for three sets) and kneel-jumps (Figure 19 – six repetitions for three sets) were added. The final phase of the dynamic/ballistic portion of the protocol included full intensity sprints on the athlete-propelled treadmill (Figure 20 – six repetitions for

Figure 14.
Quick A)B)C) forward/backward hops and D) E) lateral hops. These are plyometric exercises that challenge the dynamic capacity of the patellar tendons.

Figure 15.
Quick single-leg A)B)C) forward/backward hops (lateral and diagonal hops not depicted). These are plyometric exercises that challenge the dynamic capacity of the patellar tendons.

Figure 16.
Forward running bounds, with emphasis on vertical height and brief ground-contact. This plyometric exercise challenges the dynamic capacity of the patellar tendons.

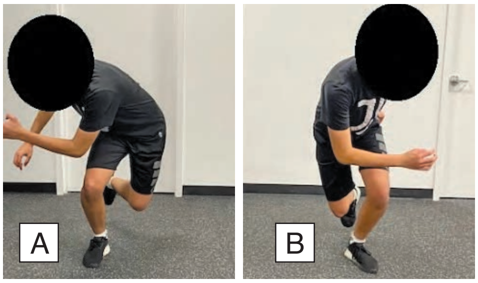

Figure 17.
Skier jumps, with emphasis on sticking the landing, then rebounding. This plyometric exercise challenges the dynamic capacity of the patellar tendons.

Figure 18.
24-inch A)B)C) double, D)E)F) single legged and G)H)I) 36-inch double legged box jumps/lands. This plyometric exercise challenges the dynamic capacity of the patellar tendons.

Figure 19.
Kneel-jumps, performed by A) initiating in a kneeling position, B) jumping, and C) landing with both legs. This plyometric exercise challenges the dynamic capacity of the patellar tendons.

Figure 20.
Full intensity sprints on athlete-propelled treadmill. This exercise was used to refamiliarize the patient to the athletic demands of the sport of soccer.

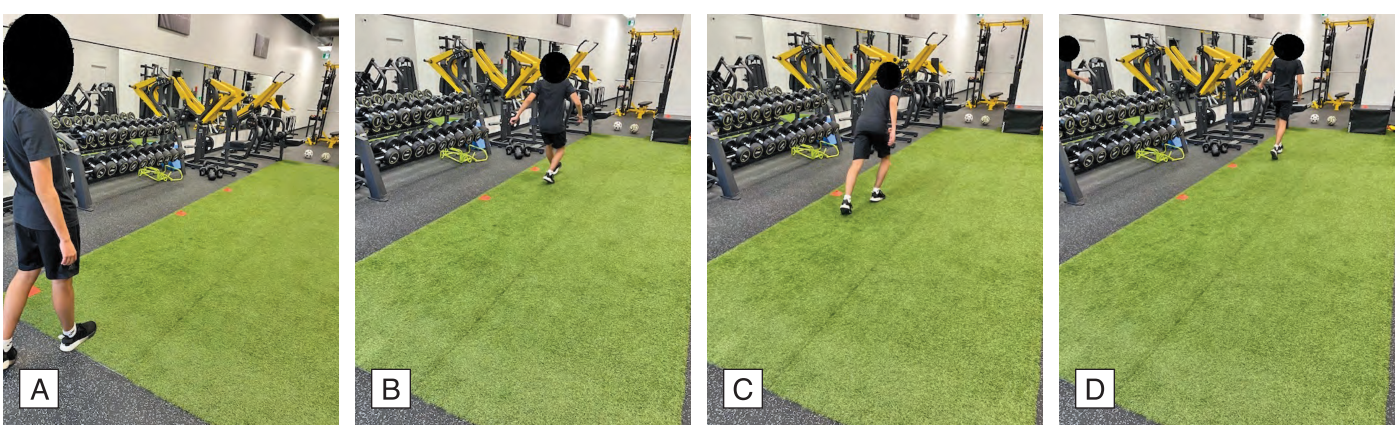

Figure 21.
Acceleration/deceleration runs (forwards). The patient A) accelerates forwards from the first cone, B) decelerates at the third cone, C) runs backwards to the second cone, and D) accelerates five yards passed the third cone. This exercise was used to refamiliarize the patient to the athletic demands of the sport of soccer.

10 seconds each), acceleration/decelerations runs (Figure 21 – six repetitions, forwards and Figure 22 – side-on), and Figure-8 runs (Figure 23 – six repetitions).

By the end of the six-week protocol, the patient had seen substantial overall functional improvements and a decreased pain intensity during training (0-1/10 NPRS). Throughout the program, the patient was repeatedly asked about pain rating during exercise and was kept to a pain intensity threshold of no greater than 3/10 NPRS. Upon discharge, the patient was able to complete a deep full squat pain free, box jump (and land) 36 inches double-footed and 24 inches single-footed, as well as perform high-energy sprints and bounds. There was also a noticeable change in quadriceps hypertrophy bilaterally, as both legs now measured 42 cm in thigh circumference (4 cm above patella). The patient was fully reintegrated with training sessions and competitive play with his soccer club as well.

Figure 22.
Acceleration/deceleration runs (side-on). The patient A) accelerates with side step-overs from the first cone, B) decelerates at the third cone, C) runs back (side step-overs) to the second cone, and D) accelerates forwards five yards passed the third cone. This exercise was used to refamiliarize the patient to the athletic demands of the sport of soccer.

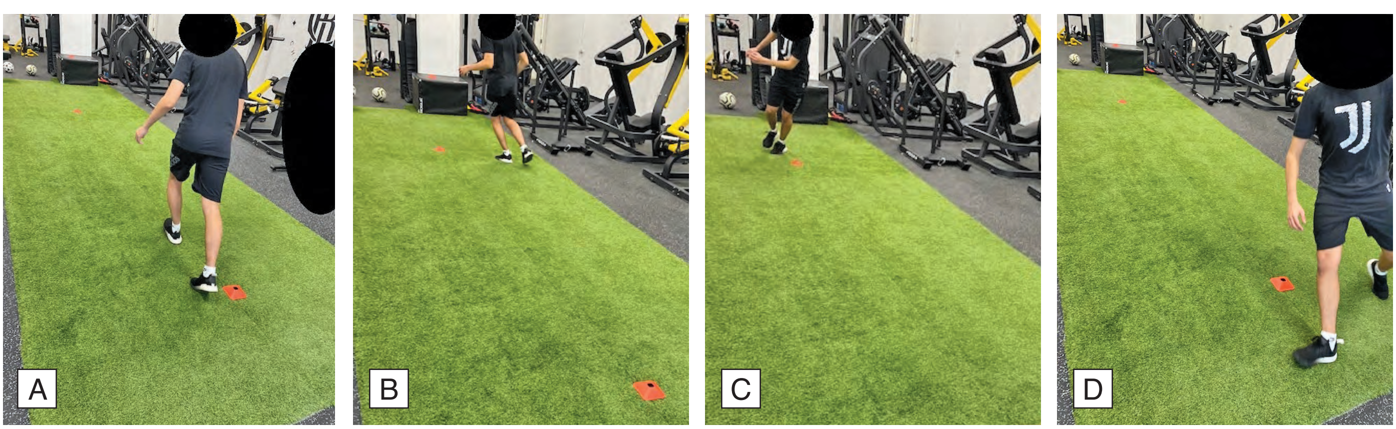

Figure 23.
Figure-8 runs, performed by A) accelerating from the start cone, B)C) decelerating and rounding the second cone, and D) returning to the first cone and repeating. This exercise was used to challenge agility and refamiliarize the patient to the athletic demands of the sport of soccer.

Discussion

This case report aims to highlight the shortcomings associated with relying solely on interpretation of MRI scans in athletic adolescent knee conditions without appropriate consideration and evaluation of the clinical presentation, historical context, and physical examination of the patient. Although the negative predictive value may be high in MRI studies[20], findings must first and foremost correlate with the clinical picture of the presenting patient, including a thorough history and physical examination, before invasive procedures are explored. Without appropriate consideration of the entire clinical picture of the individual patient, an inaccurate plan of management may be pursued, as well as unnecessary therapies or procedures.

In the clinical case presented, the patient's clinical presentation, history, and physical examination did not correlate with the MRI finding of the left lateral meniscal tear. In a study comparing history and physical examination with MRI, it was concluded that appropriate history taking in conjunction with appropriate physical examination provided important diagnostic factors with regards to predicted probability of meniscus tears.[25] More specifically, a positive McMurray's test along with historical claims of "locking" and "giving way" demonstrated a diagnostic specificity ranging between 92-96%.[25] The diagnostic accuracy was even further enhanced when MRI studies were performed (sensitivity of 97.4%), however only when correlated with the previous history and physical examination findings.[25] The patient presented in this report had not experienced any symptoms of locking or giving way, and demonstrated a negative McMurray test during examination. Additionally, a clinical utility study examining the performance of Thessaly's test demonstrated a specificity 90.7% and sensitivity 90.6% in diagnosing meniscal tears.[18] This orthopedic test was also negative in our patient. MRI, however, is strongly recommended as a clarifying diagnostic tool when a clinical examination indicates a lesion of the meniscus, as the combination of clinical and MRI findings can reduce the number of blank arthroscopies to 5%.[26] MRI is useful, but should be reserved for situations in which an experienced clinician requires further information before arriving at a diagnosis.[27]

As the MRI finding of a left lateral meniscus tear was determined to be clinically and symptomatically irrelevant in the presenting patient, the chiropractor sought a diagnosis that may better distinguish a more accurate underlying source of the patient's pain and functional limitations. Given that the patient exhibited hallmark features of patellar tendinopathy, this primary diagnosis ensued. The two characteristic features of patellar tendinopathy are as follows: (1) pain localized to the inferior pole of the patella; and (2) load-related pain that increases with the demand on the knee extensors, notably in activities that store and release energy in the patellar tendon[28]. Patellar tendinopathy is primarily a condition of relatively young (15 to 30 years old) athletes, especially men, who participate in sports requiring repetitive loading and energy absorption of the patellar tendon.[28] This description aligned with the patient's demographic, history, and reproduction of symptoms. Other differential diagnoses considered in this patient case included quadriceps tendinopathy, due to the location of the pain, aggravating activities and demands of the sport (running, jumping and change in direction); patellofemoral pain syndrome; iliotibial band syndrome; and Hoffa's fat pad syndrome.

Intervention for the patient's condition was systematically aimed at initially addressing pain reduction, followed by introducing a progressive resistive exercise program to target strength deficits, power exercises to improve the capacity in the stretch-shorten cycle, and finally functional return-to-sport training.[29] From a passive care perspective, it has been postulated that myofascial manipulation of the knee extensor muscle group can demonstrate some positive clinical effects on reducing pain in patellar tendinopathy patients in the short-term and long-term follow-up.[30] From an active care perspective, we began the protocol with sustained isometric contractions, as they have been shown to induce analgesia to the affected tendon.[31] Isometric exercises were then progressed to eccentric exercises, as they have been demonstrated in the literature to be effective in the management of tendinopathy.[32] Eccentric training improves patient symptoms and reverses tendinopathy pathology, while enhancing tendinous load capacities.[32] The final phase of the protocol included functional strengthening and return-to-sport training. Faster contractions can progress loads towards the stretch-shorten cycle that forms the basis for return to sports.[29] Exercises such as skipping, jumping and hopping are introduced initially, and later progress to agility tasks, direction changes, sprinting and bounding movements.[29]

From a patient education perspective, it was important to inform the athlete of realistic expectations of the rehabilitation process and to understand that management of their symptoms is required throughout their sports career, whether recreational or professional.[29] Finally, from a nutritional standpoint, the body's ability to synthesize functional proteins for tissue repair was supported by increasing protein intake to 5 servings of 20 grams of protein per day.[21-23]

Summary

Approximately 22 million youth are participants in the sport of soccer worldwide.[1] Although meniscal injuries are particularly prevalent in soccer players[2], MRI findings of meniscal abnormalities in the absence of a confirming history and clinical examination may be deceptive. In the presented case, there was no clinical nor historical evidence to confirm the patient's incidental MRI finding of a left lateral meniscal tear. Instead, the clinical presentation, history, and physical examination provided the more probable diagnosis of a left patellar tendinopathy. Furthermore, the literature demonstrates that the use of MRI in the evaluation of meniscal injuries in children is less reliable than in adults[11-17], which further necessitates the vital role of appropriate historical and physical examination on adolescent patients complaining of knee pain. Knee MRI studies, without a comprehensive evaluation of patient history, clinical presentation, and physical examination, must be interpreted with caution, as an improper diagnosis of a meniscus tear may subsequently lead to unnecessary surgical procedures being performed, enhancing the risk of potential health complications due to surgery for the patient, as well as financial burden on the healthcare system. MRI is best used to clarify and enhance the clinical impression of a suspected meniscal tear and is not to be used in isolation.[26]

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