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Case Reports & Case Series

A rare case of peroneal nerve palsy following inside-out lateral meniscus repair in a healthy collegiate-level football player

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ABSTRACT

Case: We present a case of common peroneal nerve entrapment following inside-out lateral meniscus repair in a collegiate-level football player. To our knowledge, there are a limited number of cases describing this injury pattern in the literature, with none describing such in a college athlete.
Conclusion: This case demonstrates that even with appropriate precautionary use of accessory portals and careful retraction, nerve entrapment can still occur, but with the identification and treatment of the compression, patients and even elite athletes can make a full recovery and return to their previous level of function.

1. Introduction

The common peroneal nerve (CPN, common fibular nerve) is the lateral branch of the sciatic nerve and originates from the L4, L5, S1, S2 nerve roots [1–3]. The CPN travels inferiorly and laterally from its origin at the apex of the popliteal fossa through the posterior compartment of the thigh along the medial border of the biceps femoris tendon and posterior to the lateral head of the gastrocnemius muscle. The nerve then enters the lateral compartment of the leg as it wraps around the fibular head and enters deep to the peroneus longus tendon before bifurcating into the deep peroneal nerve and the superficial peroneal nerve. The deep peroneal innervates the anterior compartment of the leg and provides sensation to the first web space; the superficial peroneal nerve innervates the lateral compartment of the leg and provides sensation to areas of the anterolateral lower leg and dorsal midfoot [1–3].

CPN palsies manifest most frequently as foot drop or difficulty ambulating, but the presentation may be varied depending on the location and severity of nerve injury [2]. The most common cause of CPN palsy is nerve compression, however traumatic events including knee dislocation, leg lacerations, or direct, blunt trauma are also common causes of CPN injury [2]. Iatrogenic injury is less common, but well-recognized as a potential cause of nerve palsy particularly in surgeries about the knee, such as total knee arthroplasty or even resulting from routine, postoperative care such as the use of compression stockings [4–6]. There have only been a limited number of documented cases of common peroneal nerve palsy following meniscus repair [7–9], and no such reports have been documented in a collegiate athlete.

The patient in the present case was informed that data concerning his case would be submitted for publication, and he provided consent.

2. Case report

A previously healthy 22-year-old male Division-I college football player underwent arthroscopic surgery for a full-thickness anterior cruciate ligament (ACL) tear and a complex radial tear of the lateral meniscus posterior horn and body, resulting from a non-contact pivoting injury to his right knee during a football game 4 days prior. At the time of injury and on initial clinic visit a few days later, the player was motor and sensation intact in the lower extremity. Physical examination of the knee was consistent with the aforementioned injuries: mild effusion, lateral joint line tenderness, grade 2B Lachman, and positive anterior drawer. MRI imaging revealed a full-thickness ACL tear with correlating pivot-shift bone contusion pattern, and a complex radial tear of the posterior horn and body of the lateral meniscus, as well as a Grade 1 MCL strain (Fig. 1).

The player elected to undergo ACL reconstruction with bone-patellar-bone (BTB) autograft and repair versus meniscectomy of the

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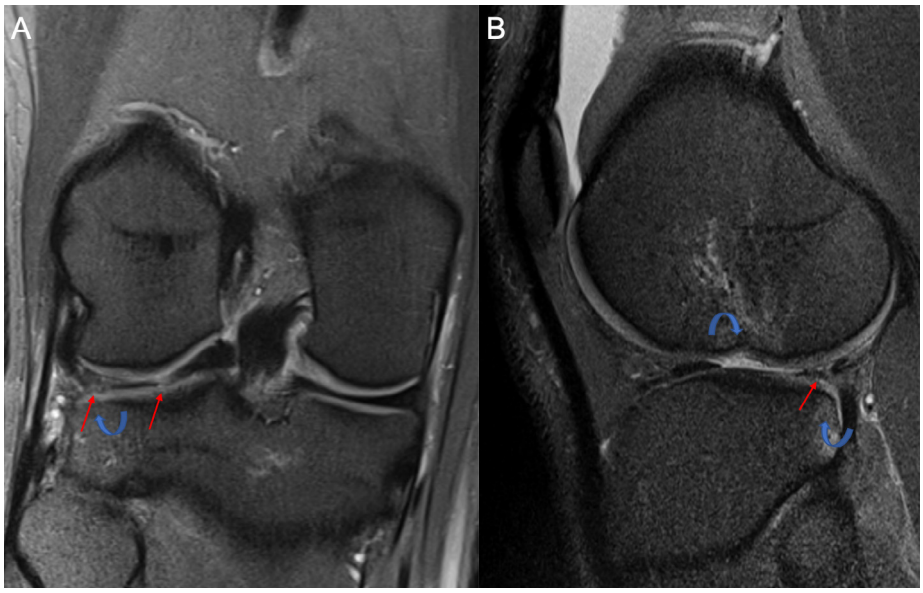

Fig. 1. Coronal (A) and sagittal (B) proton density fat saturated MRI sequences of the right knee exhibiting complex radial tear pattern of the posterior horn of the lateral meniscus (straight red arrows), as well as transchondral fractures in the lateral compartment (curved blue arrows) from the recent pivot shift injury. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

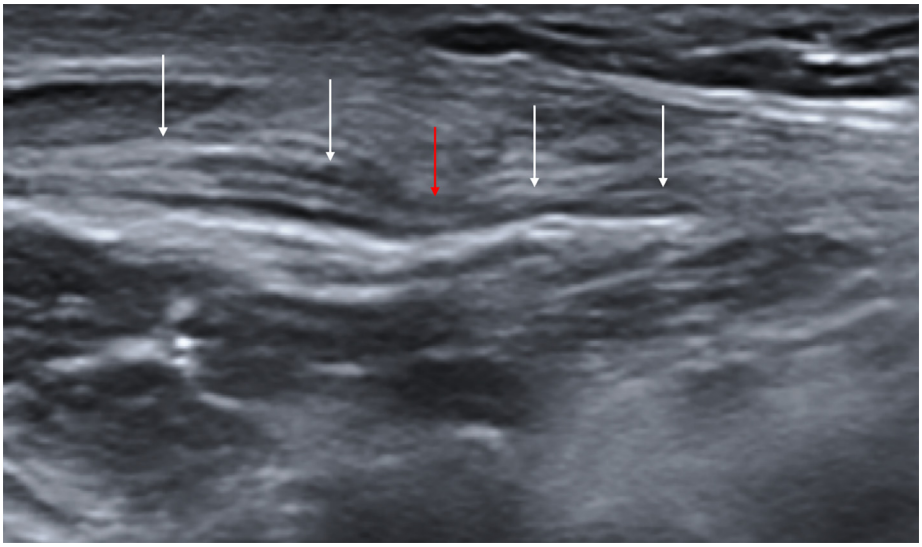

Fig. 2. Ultrasound of the lateral right knee in the coronal plane of the common peroneal nerve (white arrow) and kinking of the nerve (red arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

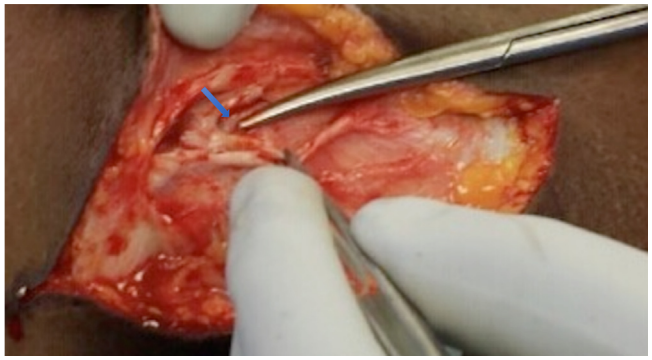

Fig. 3. Intra-operative image from a posterolateral incision of the right knee showing a suture (arrow) around the common peroneal nerve.

lateral meniscus tear. At the time of surgery, the patient had no effusion and had regained full range-of motion with intact sensation in the SPN/DPN distribution and full strength in dorsiflexion and eversion. Preoperative exam under anesthesia demonstrated a positive pivot-shift. The operation began with the BTB autograft harvest via standard technique. Diagnostic arthroscopy was begun as the graft was prepared on the back table.

Arthroscopic examination revealed an unstable, complex radial tear of the lateral meniscus with a vertical component extending at the popliteal hiatus involving a large portion of the posterior horn. Accordingly, the decision was made to proceed with an inside-out repair of the lateral meniscus. Given the complex and radial nature of the tear it was evident that an all-inside technique would not lead to anatomic reduction and adequate restoration of the meniscal hoop stresses and would likely lead to failure of the repair.

The standard posterolateral accessory portal was established for suture passing. This was performed with the knee in 90° of flexion, via an approximately four-centimeter incision along the posterior border of the LCL anterior to biceps femoris tendon. Longitudinal dissection was carried through the iliotibial band, taking care to stay anterior to the biceps femoris tendon, so as to minimize risk of injury to the CPN. Careful dissection was continued anteriorly to the lateral head of gastrocnemius until arriving at the posterior capsule of the knee. Retractors

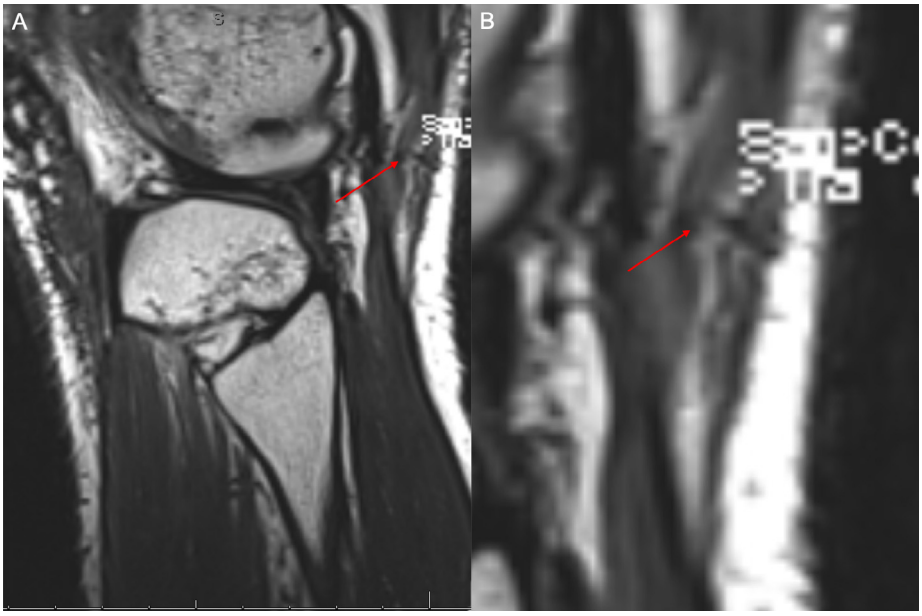

Fig. 4. Sagittal T1 weighted MRI images of the right knee (A) and a zoomed in version of the image (B) showing kinking of the peroneal nerve (arrow) at the level of the knee joint displaying the "hourglass" sign.

were placed in the interval, and four vertical mattress style sutures were placed in sequential fashion. Each suture pass was directly visualized through the accessory incision and each suture was hand-tied. A probe was used to test and confirm the stability of the repair. The remainder of the surgery including the ACL reconstruction proceeded without incident, and the patient was awakened from anesthesia and tolerated the procedure well. The patient was admitted for observation overnight, and postoperatively he had complaints of decreased sensation over the right lower leg, and weakness with ankle dorsiflexion and great toe extension. These symptoms were attributed to postoperative swelling, and the patient was discharged home the following morning.

Five-days postoperatively, the patient returned with persistent symptoms as well as marked swelling. Sixty mL of serosanguinous fluid was aspirated from the knee, and the patient was instructed to follow-up in two days with his routine, one-week postoperative appointment. In clinic, he continued to exhibit swelling of his right knee and weakness, but his right lower leg sensation had improved to baseline. Physical exam confirmed diminished sensation on the dorsum of his right foot and first web space and 0/5 strength with ankle dorsiflexion, great toe extension, and ankle eversion. The patient was thought to have a peroneal nerve palsy due to postoperative swelling, and his postoperative rehabilitation was continued.

At two weeks postoperatively, the patient's diminished sensation and weakness still had not improved, so he was referred to neurosurgery for further evaluation. Ultrasound revealed mild kinking on the long axis images of the CPN (Fig. 2), and the nerve appeared mildly hypoechoic, suggesting neuritis or nerve injury. Subsequent MRI showed an enlarged and inflamed right common peroneal nerve, but there was no obvious evidence of extrinsic nerve compression. EMG Nerve Conduction studies demonstrated no conduction through the nerve.

Due to the patient's continued lack of improvement, persistent neurologic symptoms, and suggestive imaging and nerve conduction findings, the decision was made with the patient, his coaches, and his family to undergo surgical nerve exploration by neurosurgery. Intraoperatively, there was noted a blue constrictive stitch encircling the nerve at the level of the knee joint (Fig. 3), and it was incised and removed. No additional areas of compression of the common peroneal nerve were noted, and nerve stimulation resulted in contraction of the tibialis anterior and the extensor peroneus group, confirming that there was still evidence of electrical continuity along the CPN and suggestive of potential recovery.

Postoperatively, the patient's nerve function slowly returned over the course of the following weeks, with full recovery of his sensation and motor function at twelve weeks following decompression. He was successfully able to return to full activity and play and also to participate in the NFL draft.

3. Discussion

Although arthroscopic meniscus repair is generally regarded as a safe procedure, it is not without potential complications. In a large 1986 survey, Small found a complication rate of 2.4% for meniscus repairs with complications such as nerve injury, vascular injury, infection, phlebitis, pulmonary embolism, as well as others [10]. The rate of nerve injury was 1.2% and included damage to the saphenous nerve and peroneal nerves.

Damage to the CPN is a known complication of the inside-out lateral meniscus repair [11], yet, to our knowledge, there have only been three reported cases of CPN palsy following inside-out lateral meniscus repair [7–9]. At the level of the joint, the CPN is located within a fat pad behind the lateral gastrocnemius tendon and thus is at risk of needles placed through the meniscus in an inside-out fashion if not properly protected. The distance of the nerve from the joint has been shown in cadaveric studies to increase with increasing angle of knee flexion, so keeping the knee in at least 90° of flexion during suture passage may serve as an additional precaution [12].

This case demonstrates several important points: firstly, even with appropriate precautionary use of an accessory portal with tendon retraction and knee flexion, nerve compression can still occur. We hypothesize that during one of the placements of the retractor, the fat pad in which the nerve lied became dislodged from behind the retractor and allowed placement of the aberrant suture. Next, ultrasound and MRI are extremely useful modalities to additionally investigate the injury, but the findings are often subtle, and may contradict each other. In this case, ultrasound imaging revealed kinking of the nerve (Fig. 2), but initial review of the MRI failed to confirm compression. Following surgical confirmation of compression, a more-detailed review of the MRI by a board-certified musculoskeletal radiology did show a small area on the common peroneal nerve of kinking exhibiting an

"hourglass" sign (Fig. 4). This initial contradiction led to attribution of the patient's symptoms to persistent post-operative swelling, which were thought to fully resolve with rehabilitation as the patient's swelling and lower leg sensation improved two days after knee aspiration. However, this case demonstrates that continued neurological deficits despite lack of imaging findings may warrant nerve conduction studies, even if extensive post-operative swelling persists for more than a week. Lastly, with appropriate diagnosis and surgical decompression, patients—even collegiate football players—can recover and even recover to a high level of function; indeed, Anderson et al. demonstrate that even in cases of late exploration up to seven months, patients can still make full sensory and motor recovery [9].

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.inat.2019.100619.

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