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Simultaneous Ipsilateral Anterior Cruciate Ligament and Proximal Hamstring Tendon Ruptures: A Case Report

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Learning Point of the Article:

The synergistic relationship between the ACL and hamstring muscles in preventing anterior translation of the tibia necessitates staged reconstruction in the setting of a simultaneous injury to protect the new ACL graft.

Abstract

Introduction: Simultaneous anterior cruciate ligament (ACL) and ipsilateral hamstring ruptures have never been reported in the literature. The purpose of this article is to describe a treatment approach for such a case. The principles in this case can help guide treatment for any patient with concomitant ACL and hamstring pathology.

Case Report: We describe the case of a 53-year-old male who presented with left ipsilateral simultaneous complete proximal hamstring tendon (HT) and ACL tears after an acute tennis injury. He was successfully treated with a staged procedure, first with a proximal HT repair and later with a delayed ACL reconstruction using a bone-patellar tendon-bone autograft.

Conclusion: Ipsilateral simultaneous complete proximal HT and ACL tears can be successfully treated with acute proximal HT repair and delayed ACL reconstruction after rehabilitation from the HT repair. The synergistic relationship between the ACL and hamstring muscles in preventing anterior translation of the tibia necessitates staged reconstruction in the setting of a simultaneous injury.

Keywords: Anterior cruciate ligament, hamstring tendon, orthopedics.

Introduction

Anterior cruciate ligament (ACL) ruptures are a common athletic injury, with an estimated annual incidence of 100,000–200,000 in the United States [1]. Surgical treatment options include reconstruction with bone-patellar tendon-bone (BTB), hamstring tendon (HT), or quadriceps tendon autograft or allograft.

In 1985, Walla et al. reported that hamstring function is particularly important in the ACL-deficient knee because the hamstring muscles prevent anterior translation of the tibia and unload the ACL [2]. More recent studies have reported an increased incidence of ACL ruptures in patients with a history of hamstring injuries [3] and an increased incidence of hamstring injuries in patients with a history of ACL injury [4], highlighting the synergistic relationship between the structures [3]. While acute hamstring strains are a common injury in athletes, proximal hamstring tears or avulsion injuries are much less common and are treated as a separate injury [5, 6]. A lack of prompt recognition and treatment of proximal HT ruptures can lead to a delay in return to sports and long-term functional impairments, persistent pain, and sciatic nerve symptoms [7-9].

To our knowledge, simultaneous ACL and ipsilateral hamstring ruptures have never been reported in the literature. Therefore, the purpose of this article is to describe a treatment approach for such a case. The principles in this case can help guide treatment

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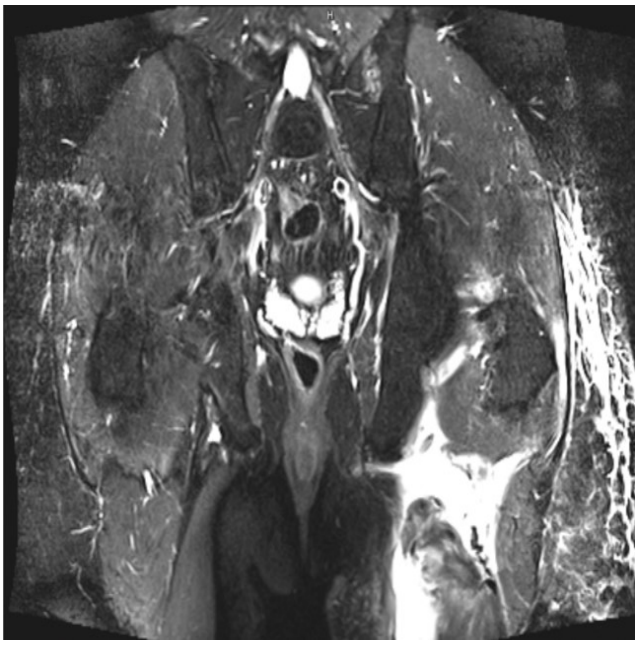

Figure 1: Coronal short tau inversion recovery (STIR) MRI of the left hip showing the complete proximal hamstring tendon rupture with 8 cm of tendon retraction and large surrounding hematoma.

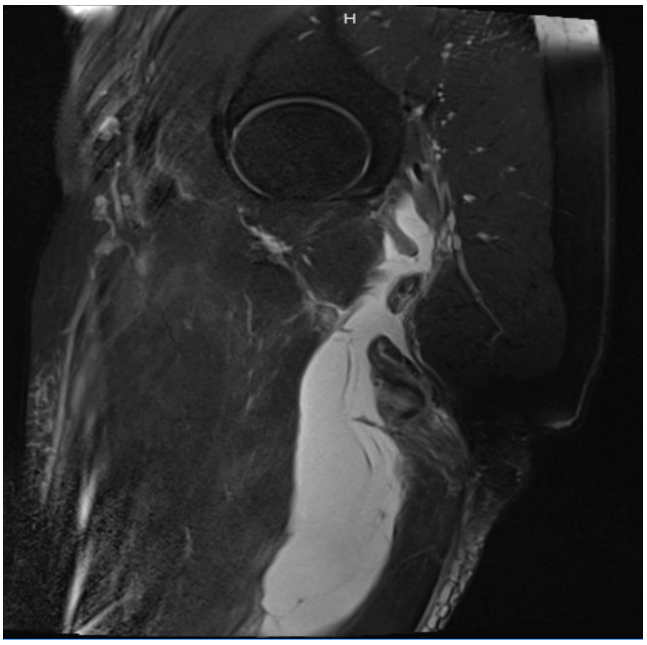

Figure 2: Sagittal T2 fat-suppressed MRI of the left hip showing the proximal hamstring tendon rupture with 8 cm of tendon retraction and large surrounding hematoma.

for any patient with concomitant ACL and hamstring pathology. The patient was informed that his case would be submitted for publication, and he provided consent. Institutional Review Board approval was not required for the publication of this case report.

Case Report

A 53-year-old previously healthy male presented after sustaining injuries to his left knee and posterior thigh while playing tennis. The patient stated that he was lunging to hit a ball when he felt a pop in his posterior thigh. Upon planting his foot, he also felt a pop in his knee. He experienced immediate pain and an inability to ambulate.

X-rays in the emergency department were negative. Upon presentation to the clinic 7 days later, the patient had marked posterior left thigh ecchymosis that extended proximally to the gluteal crease. There was palpable fullness distal to the gluteal crease. Knee examination was significant for a 2+ Lachman test and mild effusion.

Subsequent MRI of the pelvis revealed proximal common HT rupture with 8 cm of tendon retraction and a large surrounding hematoma (Fig. 1 and 2). A knee MRI demonstrated a complete rupture of the ACL and a complex tear of the posterior horn of the medial meniscus (Fig. 3).

Treatment options included non-operative treatment and repair or reconstruction of one or both tears. Following shared decision-making, the patient elected to proceed with aspiration of the hematoma to improve knee range of motion (ROM) and ameliorate his symptoms, followed by operative repair of the left tendon rupture. The plan was to assess knee stability and function after the tendon repair and then consider reconstructing the ACL.

Surgical technique: Proximal HT repair

The patient was placed in the prone position on the operating table. An incision was marked transversely along the gluteal fold. The stump of the avulsed hamstring was palpable just distal to the planned incision site, as was the planned repair location on the ischial tuberosity. Dissection was conducted to the gluteal fascia, and the thickened hamstring fascia and bursa were identified. The avulsed HTs were identified and mobilized so the repair could be completed under minimal tension. The sciatic nerve was identified just anterior to the HT muscles. Next, three sets of locking stitches were run along the tendon, and three G-4 suture anchors (Mitek, Chesterfield, MO) were placed in the ischial tuberosity. The residual tendon origin was used to help guide anchor placement. The sutures were tied down, and the tendon was oversewn with a suture from the central anchor. The patient was placed in a knee ROM brace (Bledsoe) locked at 60° of flexion to take tension off the repair. He was made non-weightbearing on his left lower extremity.

Rehabilitation after proximal HT repair

Table 1 outlines the patient's post-operative protocol. He had

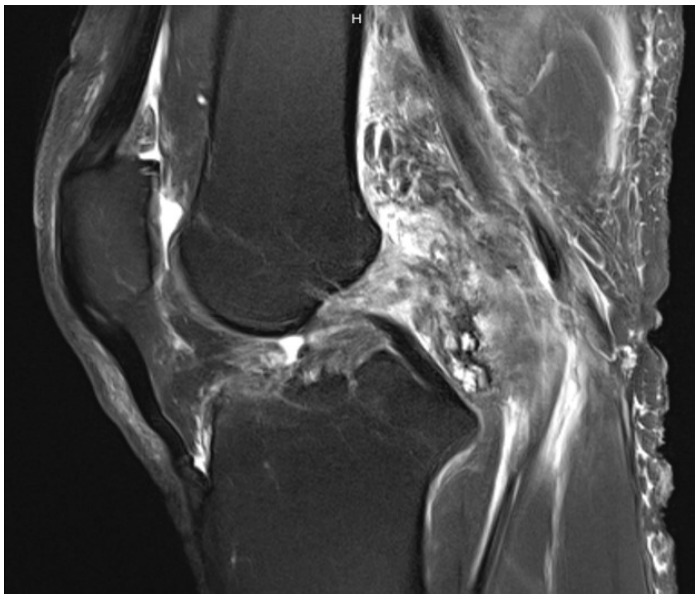

Figure 3: Sagittal proton density fat-suppressed MRI of the left knee showing the ruptured anterior cruciate ligament.

4/5 tibialis anterior and extensor hallucis longus weakness and paresthesia immediately post-operatively, attributed to a common peroneal nerve traction injury. These symptoms resolved within 2 months with the use of a home-based personal biofeedback unit. At 5 months, his rehabilitation progress slowed, and he complained of persistent instability in his left knee. On physical examination, he continued to have a 2+ Lachman test. An MRI again showed a ruptured ACL and medial meniscal tear. Because he had persistent physical limitations, the patient elected to proceed with ACL reconstruction with a BTB autograft.

Surgical technique: ACL reconstruction

The patient was placed supine on the operating table, and a tourniquet was placed around the left upper thigh. An incision was made at the anterior aspect of the knee from the inferior pole of the patella down the tibial tubercle, exposing a 30-mm-wide patellar tendon. The central 10 mm were taken with bone plugs. Diagnostic arthroscopy revealed a complete rupture of the ACL and a medial meniscus tear involving 30% of the middle and posterior third. The meniscal tear was debrided to a stable rim. The patient underwent a 2-incision ACL reconstruction with his patellar tendon autograft fixed with two 17-mm ligament buttons. The knee was taken through a full ROM and noted to be stable to Lachman and anterior drawer testing. The wounds were irrigated and closed in a layered fashion. The patient was then placed in a knee brace, locked in extension.

Rehabilitation after ACL reconstruction

Table 2 outlines the patient's post-operative protocol. At his 2-year follow-up from the ACL reconstruction (approximately 2.5 years after the hamstring repair), he had no complaints and was jogging and playing golf. His left knee ROM was 8° of hyperextension and 135° of flexion; strength and endurance testing of the quadriceps and hamstrings were within 15% of the contralateral side; and he had a stable Lachman test.

Discussion

We describe here a treatment approach for ipsilateral simultaneous complete proximal HT rupture and ACL tears. In any clinical encounter, it is important to maintain a high index of suspicion for concomitant pathologies; in this case, a thorough physical examination revealed posterior thigh ecchymosis, a knee effusion, and a positive Lachman test, which led to the diagnosis of two simultaneous injuries.

The next step was to prioritize treatment options. Conservative treatment for proximal hamstring tears can result in poor outcomes, including persistent pain, decreased function, and an inability to participate in sports [7-9]. Therefore, surgical repair is typically recommended for partial-thickness tears that have not improved with non-surgical care, for 2-tendon injuries with retraction of ≥ 2 cm, and for complete 3-tendon injuries [8, 10, 11]. Early treatment is preferred because chronic injuries are more challenging to repair and have a higher risk of complications [7, 8, 10]. Because of the knee ROM restrictions placed to rehab from

Post-operative time	Rehab progression to facilitate soft tissue healing and recovery
2 weeks	Progressed to toe touch, weightbearing
	Allowed 40–90° of knee flexion
	Biophysical agents, manual therapy, and hydro treadmill utilized
6 weeks	Progressed to weightbearing and range of motion as tolerated
	Antigravity treadmill used to assist with weightbearing progression
10 weeks	Knee brace discontinued

Table 1: Patient post-operative rehab protocol after proximal hamstring repair.

Post-operative time	Rehab progression to facilitate soft tissue healing and recovery
2 weeks	Progressed to weightbearing as tolerated with crutches
	ROM progressed to 120° of knee flexion
6 weeks	Progressed to ambulating without assistive device, with knee immobilizer unlocked
	ROM progressed to 130° of knee flexion
	Progressed activities of daily living, including climbing stairs without assistive device
10 weeks	Progressed activities of daily living, including descending stairs without assistive device
16 weeks	Started return to run program after demonstrating 85% limb symmetry index
	Demonstrated strong eccentric control with landings to progress to rotational movements
20 weeks	Cleared for full participation in recreational golf after demonstrating 100% limb symmetry index

Table 2: Patient post-operative rehab protocol after anterior cruciate ligament reconstruction.

the hamstring repair, and because complications can arise if knee ROM cannot be regained after ACL reconstruction [12], we recommended that the patient proceed with proximal HT repair first, with consideration of ACL reconstruction only after recovery.

After recovering from the tendon repair, the patient elected to proceed with ACL reconstruction. ACL reconstruction is usually recommended for active individuals who wish to return to high-level sports or activities that involve cutting or pivoting motions [13]. Non-operative treatment involves bracing and physical therapy and is often recommended for older individuals and those who might not require a high level of knee stability [13]. Recent studies have shown that delaying ACL reconstruction beyond 6 months is associated with an increased rate of revision surgery and worse patient outcomes [14]. In the case presented here, we needed to prioritize recovery from the proximal HT repair, and the delayed ACL reconstruction appears not to have negatively affected the patient's 1-year outcome.

There is a known relationship between hamstring and ACL injuries. Visser et al. reported an increased risk for hamstring injuries in patients with a history of ipsilateral ACL reconstruction [4]. Conversely, a history of hamstring injuries has been reported to be associated with an increased risk of ACL rupture [3]. The proposed mechanism for synergistic functions of the ACL and hamstring musculature is that hamstring muscle contraction unloads the ACL by resisting anterior translation of the tibia, therefore decreasing the risk of ACL rupture [3]. This synergistic relationship provides a challenge for treating both injuries simultaneously. In our review of the literature, which included a database search on PubMed and Embase with the terms ACL, hamstring, and simultaneous, we did not find any articles that mentioned cases of simultaneous ACL and hamstring ruptures.

Furthermore, an ipsilateral hamstring injury alters graft selection options for ACL reconstruction. Two of the most commonly used graft options for ACL reconstruction are BTB and HT autografts [15]. A recent systematic review and meta-analysis of randomized controlled trials reported no significant differences between BTB and HT grafts with regard to returning to a pre-injury level of physical activity or sports participation [15]. In our case, an HT graft was not possible because of the proximal hamstring injury, so BTB was an appropriate graft choice.

Conclusion

Ipsilateral simultaneous complete proximal HT and ACL tears can be successfully treated with acute proximal HT repair and delayed ACL reconstruction after rehabilitation from the HT repair.

Clinical Message

This case report presents the first simultaneous ACL and ipsilateral hamstring ruptures reported in the literature. Although this case was rare, the important principles in the case can be applied to more common clinical scenarios. The synergistic relationship of the ACL and hamstring muscles in preventing anterior translation of the tibia necessitated healing of the HTs before ACL reconstruction to protect the BTB autograft.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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