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Trauma Case Reports

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Case Report

Bilateral patellar tendon repair with suture bridge augmentation: A case report

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ARTICLE INFO

Keywords:

Bilateral
Patellar
Tendon
Rupture
Suture
Bridge

ABSTRACT

We describe the case of a 37-year-old male who presented with simultaneous bilateral patellar tendon rupture without any associated risk factors. Additionally, this is the first reported use of the suture bridge technique with patellar and tibial suture anchors in repairing bilateral proximal patellar tendon rupture. At 12-month follow-up, the patient had normal alignment, no effusion, and symmetric quadriceps strength.

Introduction

Acute simultaneous bilateral patellar tendon rupture is a rare occurrence that disrupts the extensor mechanism of the knee joint [1]. Bilateral patellar tendon rupture (BPTR) is associated with underlying systemic disease including systemic lupus erythematosus, rheumatoid arthritis, thyroid disease, and chronic kidney disease [1]. Other predisposing factors include local steroid injection, anabolic steroid use, fluoroquinolone use, and jumper's knee [1]. However, many cases described in the literature include no predisposing factors [2]. Sport participation and trauma induced spontaneous bilateral patellar tendon rupture are also common mechanisms of injury [3].

We provide a case of simultaneous bilateral patellar tendon rupture repaired using a novel technique for this type of injury. This operative technique includes the well-known Krakow locking stitch in addition to FiberTape sutures crisscrossing in a suture bridge configuration. The patient was informed that data related to the case would be submitted for publication, and he provided consent.

Case presentation

Our patient is a healthy 37-year-old Hispanic male who sustained a simultaneous rupture of his bilateral patellar tendons after jumping attempting to make a "lay-up basket" while playing basketball. Pertinent history includes anterior cruciate ligament (ACL) reconstruction of the right knee using an ipsilateral bone-patellar tendon bone (BPTB) autograft in 2002. The patient was unable to ambulate and presented to our clinic in wheelchair. The patient was unable to perform a straight leg raise and had a tender defect at the inferior pole of the patella bilaterally. Plane radiographs demonstrated bilateral patella alta and MRI studies demonstrated bilateral

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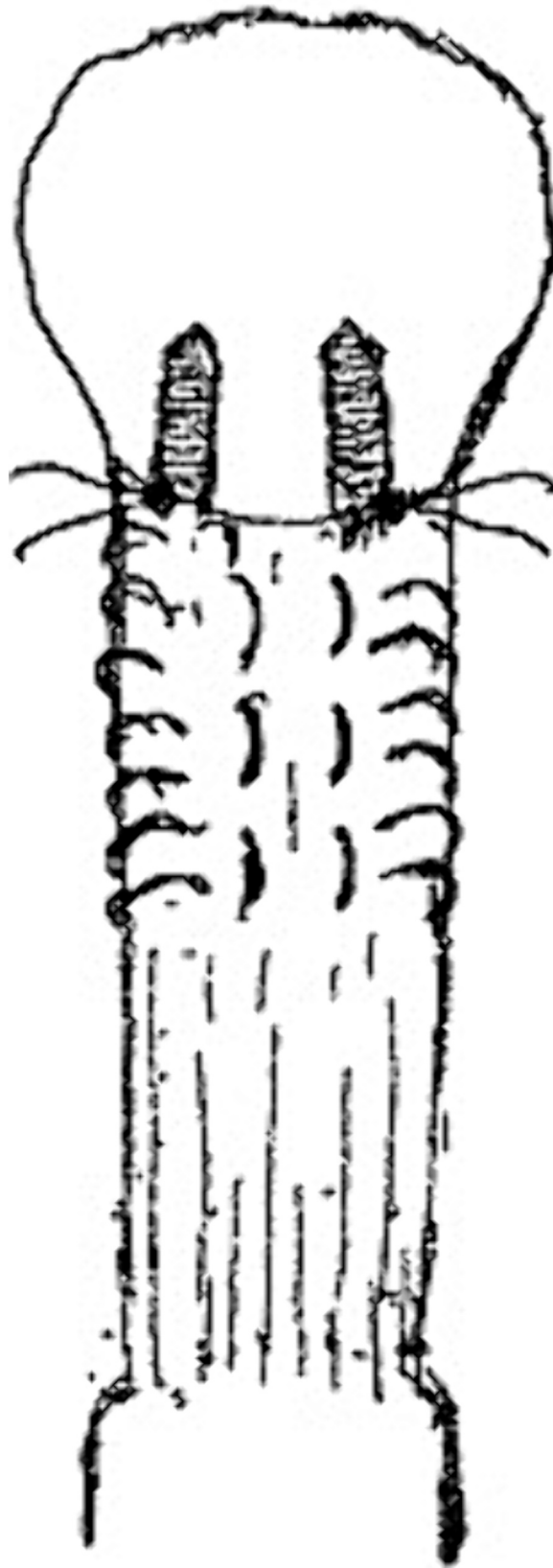
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<https://doi.org/10.1016/j.tcr.2024.101097>

Accepted 12 September 2024

Available online 14 September 2024

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Fig. 1. Two SwivelLock (Arthrex, Inc) suture anchors at the inferior pole of the patella with a Krackow stitch brought down the patella in a locking stitch configuration.

proximal patellar tendon ruptures. The recommendation for acute simultaneous surgical repair of both knees was given to the patient.

Operative technique

Intraoperative exam showed significant swelling of both knees, with full extension and flexion to 140 degrees bilaterally. There was palpable defect and patella alta bilaterally associated with patellar tendon rupture.

The knee was approached through the standard anterior midline approach. The extent of the tear was elucidated, involving both the medial and lateral retinaculum. A hematoma was evacuated, and the deep and subcutaneous tissues were irrigated. Traction sutures were placed in the quadriceps tendon to help mobilize the patella distally. The proximal patellar tendon and the distal stump of the patellar tendon were elucidated.

Two 4.75 mm bio-composite SwiveLock suture anchors (SpeedBridge Implant System with Scorpion-Multifire Needle, Arthrex, Inc., No. AR-2600SBS-8) were placed within the inferior pole of the patella at the origin of the patellar tendon. A Krackow locking stitch was performed with each of the SwiveLock suture anchors with a pull through suture. This was brought up and down the patellar tendon in a locking stitch configuration (Fig. 1). The knee was placed in 30 degrees of flexion, and the patellar length was made to be 4.5 cm. As the patient did not have an intact contra-lateral patellar tendon to base our patella tendon length, 4.5 cm was chosen as this has been an average male patella length recently described in the literature [4]. Intraoperative C-arm fluoroscopy was utilized to confirm appropriate patellar height. This was double checked by attempting to obtain a Caton-Deschamps index of approximately 1:1 [5]. The knots were then tied down from the locking stitch configuration in the upper repair back onto the suture anchors in the patella.

The same anchors had #2 FiberTape sutures (Arthrex, Inc) loaded. These were crisscrossed in a suture bridge configuration and placed in separate SwiveLock anchors in the tibial tubercle with the knee at 30 degrees of flexion (Fig. 2). The remaining paratenon and soft tissue was imbricated to help reinforce the repair. The medial and lateral retinaculum were then repaired with a running locking #2 FiberWire suture (Arthrex, Inc). After an extensive irrigation of the deep and subcutaneous tissues, a standard layered closure was then performed.

The left knee was addressed next in an identical fashion. At the end of this case, each knee was able to obtain 0 to 30 degrees of flexion without any undue tension on the repairs.

Patient follow-up

The patient remained non-weight bearing except for transfers for 6 weeks post-operatively. Both knees were initially locked in full extension with a brace. Two days after surgery, the patient started physical therapy with Continuous Passive Motion machine, increasing ~15° per week. After 6 weeks, the patient started full weight bearing with braces locked in extension with a walker. His ROM was approximately 0–110° on both legs, and he could perform straight leg raises without difficulty.

At 10 months he demonstrated 5/5 quadriceps strength, –10° of extension, and 140° of flexion bilaterally. Knee Documentation Committee (IKDC) score was 57 bilaterally.

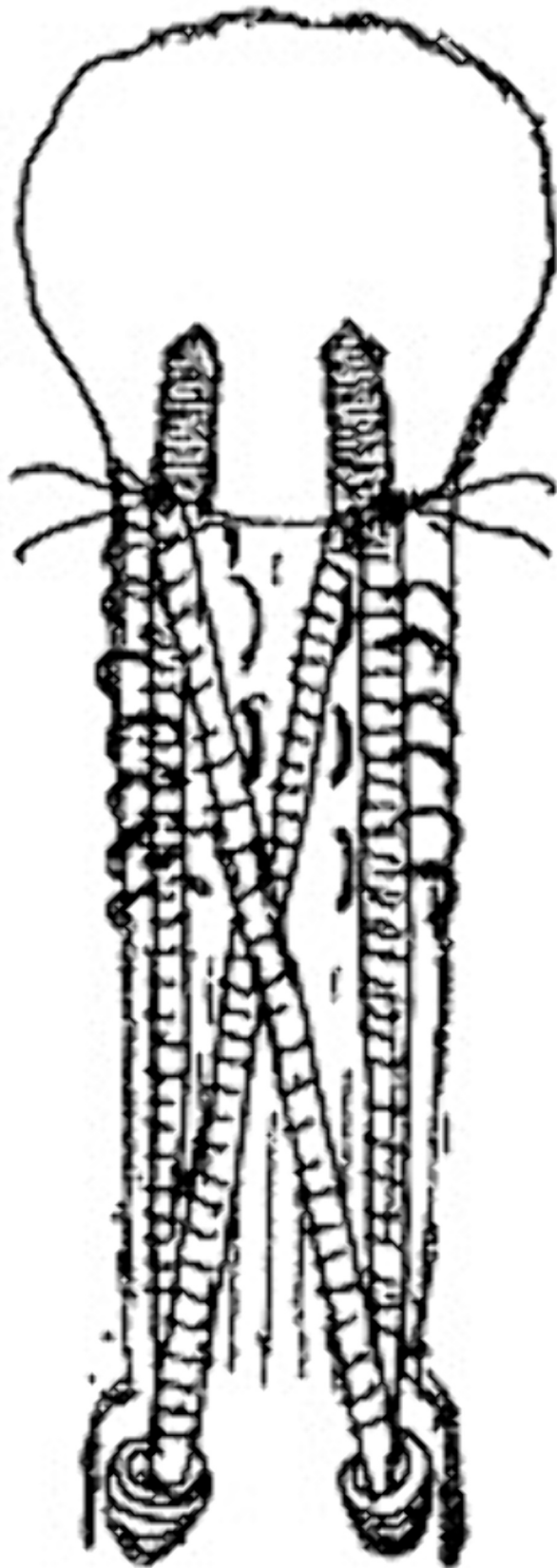
At 12 months the patient had normal alignment with symmetric quadriceps strength bilaterally. His ROM remained at –10 degrees of uncorrectable passive extension and 140 degrees of flexion bilaterally. The patient's right and left knee IKDC score improved to 69 and 72, respectively. His recorded Lysholm score at 12 months for his right and left knee was 94 and 99, respectively.

Discussion

Bilateral patellar tendon rupture is an extremely rare injury, especially in individuals without risk factors. Given the rarity, clinical suspicion is low, commonly leading to misdiagnosis and delays in treatment [6]. In a recent review by Murphy et al., there are 17 reported cases of BPTR in adults without systemic risk factors, eight of which occurred while playing sports [3]. Most cases of spontaneous rupture occur during eccentric contraction of quadriceps with the knee in flexion, commonly when coming to a sudden stop or landing from a jump. Bilateral patellar tendon rupture should not be overlooked in healthy patients presenting after minor trauma who cannot extend their knees. Prompt surgical management and physical therapy are both required to ensure maximum recovery of these patients.

To the authors' knowledge, this is the first reported case of BPTR in a patient with previous BPTB autograft ACL reconstruction. Of note, unilateral patellar tendon rupture following BPTB autograft in ACLR is a rare but acknowledged risk factor of with an estimated incidence of 0.22 % with some reported instances up to 12 years post injury [7,8]. However, given the length of time since injury it is difficult for the authors to determine how the patient's history contributed to the described case.

The suture bridge technique was first described for arthroscopic rotator cuffs by Park et al. in 2006 [9]. This technique has been widely applied in shoulder surgery, and its scope of application continues to expand. It is being increasingly utilized in knee surgery for repairs such inferior patellar pole fracture and isolated avulsion fracture of the tibial tuberosity [10–12]. In this case, the suture bridge was in used in addition to the common suture anchors with Krakow technique for further reinforcement. Suture bridge enables an hourglass pattern of FiberTape suture to be laid over the distal tendon. The four-anchor construct creates a knotless repair and a greater area of compression of the tendon on its anatomic bony footprint which promotes further healing.



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Fig. 2. #2 FiberTape sutures (Arthrex, Inc) utilized in a suture bridge configuration, reinforcing the previous Krackow stitch with two suture anchors in the tibial tuberosity.

Conclusion

Bilateral patellar tendon ruptures are a rare occurrence not extensively documented in current literature. The suture-bridge technique presented here shows promising results for future utilization in such cases.

Takeaways

- Suture bridge technique can be used in addition to the Krackow technique for additional tendon reinforcement.
- Bilateral patellar tendon ruptures occur in people without systemic risk factors. Sports participation is a common mechanism of injury.

CRedit authorship contribution statement

Brett Biedermann: Writing – review & editing, Writing – original draft. **Will Hill:** Writing – review & editing, Data curation, Conceptualization. **William J. Karakash:** Writing – review & editing, Visualization, Validation. **Ioanna K. Bolia:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Conceptualization. **George F. Rick Hatch:** Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

G.H.: Arthrex (consulting fee). All other authors have no competing interests.

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