CLINICAL REPORT

Chronic patellar tendon rupture reconstruction with a semitendinosus autograft

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Summary
Chronic patellar tendon ruptures are somewhat rare, thus little work has been done in this area and their true incidence is not known. The management of a neglected, chronic patellar tendon rupture must address three difficulties: the proximally retracted patella, the reconstruction of the patellar tendon, finally, the temporary protection of this repair. By presenting a case of a chronic patellar tendon rupture, the advantages of reconstruction with an isolated semitendinosus tendon autograft, especially from an early rehabilitation perspective, are described.

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Introduction

Patellar tendon ruptures mostly occur in persons under 40 years of age [1–3], typically during a sporting activity [4–6]. The tendon is usually completely ruptured at the proximal insertion [7]. Treatment of acute patellar tendon ruptures involves direct tendon to tendon repair or transosseous sutures, usually combined with an additional procedure to temporarily protect the repair [1]. A rupture becomes chronic or neglected if not diagnosed. This is not a common injury [9]. No extensive case series have been published. Through a case report of a chronic patellar tendon rupture, the challenges and advantages of reconstruction with an isolated semitendinosus tendon autograft followed by early rehabilitation are described.

Case report

The patient was a 49-year-old male carpenter, who routinely works on his knees and averages 3 h/week of sports participation. He ruptured his left patellar tendon at 28 years of age; the rupture was repaired by end-to-end suturing and protected with cerlage; the outcome was favorable. The patient did not have any systemic diseases or concurrent treatments that would have weakened the tendon.

While playing football, the patient felt a buckling of his right leg when landing from a jump, followed by pain in the anterior aspect and functional disability. At the emergency ward, the clinical examination revealed prominent pain in the medial patellar retinaculum and lateral radiographs...
showed a patella alta (Caton Deschamps index = 1.5) with the patella having the typical overuse appearance for an athlete (Fig. 1a). A diagnosis of patellar instability was made. A splint was used to immobilize the injury site. After 1 month, rehabilitation sessions were initiated and there was a good progression. Four months after the injury, the patient described experiencing weakness and being unable to lock his knee when going down stairs over the previous 5 weeks and had the impression that the patella was moving upward, especially when seated. Clinical evaluation confirmed this proximal migration along with an infrapatellar void. However, the patient could actively extend his leg. Pushing down on the patella caused pain and the patellar femoral grinding test was positive. Ultrasonography confirmed the diagnosis of a chronic patellar tendon rupture with a background of chronic tendinopathy. A surgical intervention was warranted.

Using a mid-line incision, full exposure of the patellar tendon revealed that the tendon was not inserted on the pole of the patella. However, there was a continuum of fibres, which were sufficient to support active extension. After debridement and freshening of the pole of the patella, distal mobilization of the patella was performed. A horizontal tunnel was drilled with a 4.5-mm bit in the lower half of the patella, through which three non-resorbable Mersuture® 3/0 strands were passed; these were used to reinsert the patellar tendon on the patella. The semitendinosus tendon was harvested through a small incision over the pes anserinus. A tendon stripper was used to harvest the tendon, which was pulled through the main incision. The tibial insertion of the semitendinosus tendon was kept intact. A second tunnel was drilled horizontally with a 6-mm auger into the upper half of the patella. The harvested tendon was passed through this tunnel from medial to lateral and then sutured to both sides of the patellar tendon in 30° of flexion. In this position, the length of the patellar tendon was equal to the height of the patella, according to the Insall-Salvati index. The autograft tension was set so that the length of the reconstructed tendon was approximately equal to the height of the patella, without requiring an intraoperative radiograph. No tibial tunnel was made. A cross mattress suture pattern was performed with a 4-metric, non-braided, resorbable suture (PDS® 1). To obtain good patella to patellar tendon continuity and solidify the assembly, the quadriceps expansion was folded over to a 1.5-cm width and sutured to the patellar tendon using the same type of suture. An intraoperative flexion of 90° could be attained easily, without tension. Standard postoperative radiographs showed good restoration of the patellar height with a Caton Deschamps index of 1 (Fig. 1b).

Full weight bearing was allowed at Day 1 and protected with an extension splint between physiotherapy sessions. The initial rehabilitation aimed at restoring passive range of motion up to 90° of flexion during the first 45 days; no active extension was allowed. Starting in week 6, the range of motion was gradually increased and quadriceps strengthening initiated.

At a 2-year follow-up, full flexion could be achieved and was comparable to the contralateral side, quadriceps strength was marked as 5/5 and thigh girth at 10 cm above the patella was comparable to the left side (Fig. 2). The
Reconstruction of chronic patellar tendon rupture with semitendinosus tendon

Ruptures to the extensor mechanism of the knee are rare [2,6,11]. The true incidence of patellar tendon rupture is unknown, but it is the third most common injury to the extensor mechanism, after patella fracture and quadriceps tendon rupture [10,12].

The diagnosis is not always made during the initial post-injury phase. In a retrospective series, Siwek and Rao [10] found chronic injuries in 27% of cases. A complete patellar tendon rupture occurs in 97% of cases reported in the literature, and like ours, usually occurs at the pole of the patella [7].

Many reconstruction techniques have been proposed: synthetic material [13,14], autograft using the semitendinosus alone [15] or together with the gracilis [8] and the contralateral patellar tendon [1,12], or allograft using the Achilles tendon [3,4,9,16]. A contralateral bone-patellar tendon-bone graft consists of a composite ”quadriceps tendon, patella, patellar tendon and tibia” unit, which allows the extensor mechanism to be reconstructed and the patella to be automatically positioned at the proper height. This technique is most useful when the remaining tendon stump is not adequate or in cases of surgical revision. This is an essential technique, particularly in terms of graft fixation. Despite significant morbidity associated with autografts, allograft techniques have a risk of bacterial or viral infection, neoplasia and especially non-conventional transmissible agent transmission. They should only be considered when the extensor mechanism is extensively damaged and an autograft cannot be used.

A semitendinosus autograft is often used in knee ligament and tendon repair. This robust autograft can restore the strength and stability of the extensor mechanism with minimal donor site morbidity [15,17]. Reconstruction without a tibial bone tunnel could be used in preadolescent athletes suffering from this injury, if they are not yet skeletally mature [13]. In addition, tibial tunnel positioning and graft length are not a concern. However, this technique has risks, such as the fracture of a small patella [1].

The biggest challenge with this surgery is the need to mobilize a non-reducible patella, which was not the case with our patient. Previously, continuous preoperative traction was performed with a transverse pin in the patella for about 15 days or intraoperative traction was performed [1,4,12]. The current approach consists of lowering the proximally migrated patella through intraoperative sectioning of the patellar retinaculum and release of the suprapatellar bursa by arthrolysis [1]. If this is not sufficient, the proximal tendon of the rectus femoris can be sectioned, through a Hueter approach, to provide additional lowering [1].

Multiple authors combine the reconstruction with wire cerclage or metalwork to reduce the load on the reconstructed tendon. This device allows for early rehabilitation, but requires a second intervention of remove the implanted material. We used a turn-over flap of the quadriceps extension as a protective technique recommended by Dejour et al. [1], which allowed for 90° of flexion without tension and did not require a second intervention to remove implanted material.

Conclusion

Chronic patellar tendon ruptures are rare. Surgical repair is based on tendon augmentation with an autograft, allograft or synthetic material, but no consensus has emerged. Many of these reconstruction techniques provide satisfactory results. The use of a semitendinosus autograft reduces donor site morbidity, avoid specific risks related to allografts and does not require surgical revision to remove materials used to protect the reconstructed tendon.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References


Figure 2  Full active extension is present at 2 years follow-up. The patient was able to resume his sports activities. He had no pain and no difficulty during day-to-day activities.


