



Immediate mobilization after iliotibial band augmentation of neglected transection of the patellar tendon

Eski patellar tendon kesisinde ilyotibiyal band ile güçlendirme sonrası erken hareket

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Abstract

Patellar tendon ruptures are treated surgically. Whether immediate or delayed; primary repairs have generally been supported with some sort of patellofibular transfixation if early mobilization is desired. Neglected cases on the other hand have been augmented with autografts. Here we present a case of neglected complete transection of the patellar tendon. Although patella had not migrated proximally, the repair should have to be strong enough to bear the forces generated by the quadriceps on the extensor knee mechanism. We also intended to perform a repair that would allow immediate mobilization without adding the potential complications of internal hardware. A strip of iliotibial band was the preferred autograft to be used for patellofibular cerclage. With immediate physiotherapy, the patient progressed very well and regained full active motion at 8th week. This technique seems to be appropriate especially for salvage of acute ruptures.

Key words: Patellar tendon transection, Surgical treatment

Özet

Patellar tendon kopmaları cerrahi olarak tedavi edilir. Akut veya geç olguların erken hareketi için genellikle bir patellofibular transfiksasyon yöntemi kullanılır. Geç olgularda otogreftler ile güçlendirme uygulanır. Burada, geç kalmış bir patellar tendon tam kesisi olgusu sunulmaktadır. Patella proksimale migre olmamakla birlikte, yapılacak tamirin kuvveti kuadriseps mekanizması tarafından oluşturulan güçlere dayanabilecek düzeyde olmalıdır. Bu olguda aynı zamanda, hemen mobilizasyona izin verirken internal fiksasyonun olası komplikasyonlarından kaçınılabilecek bir yöntem tanımlanmıştır. Patellofibular serklaj için ilyotibiyal band şeridi seçilmiştir. Hemen başlayan fizyoterapi ile hasta 8. haftada tam diz hareketini geri kazanmıştır. Bu yöntem özellikle akut kopmaların onarımında uygun bir seçenek olarak görünmektedir.

Anahtar sözcükler: Patellar tendon kesisi, Cerrahi tedavi

Patellar tendon rupture is a rare injury of the extensor apparatus, usually resulting from intratendinous degeneration.^[1,2] Immediate surgical repair generally yields good results. Neglected cases on the other hand are more difficult to manage; some sort of patellofibular transfixation and/or postoperative immobilization is required to protect the repair.^[3] Here we present a case of neglected patellar tendon rupture which was repaired with a technique utilizing an iliotibial band strip that allowed immediate rehabilitation while preventing the disturbances of internal foreign material.

CASE REPORT

The patient was a 43 years old male. He was a construction worker and had sustained a penetrating injury of the anterior aspect of the left knee. The wound had been irrigated and sutured primarily in

another center. Eight weeks later, he attended to our outpatient clinic with the complaint of difficulty in walking. On examination, there was a clean transverse incision scar below the patella and the patient could not actively extend his left knee. Direct X-rays revealed calcification inside the patellar tendon, while there was no fracture. MRI study clearly demonstrated that the continuity of the patellar tendon was disrupted and the area was filled with scar tissue (Figure1).

With the diagnosis of complete patellar tendon transection, surgical repair was planned. First a longitudinal incision was made between patella and tuberositas tibia. The level of transection was about 2 cm below the inferior pole (Figure 2). The fibrotic tissue at the level of transection was removed and the ends of the tendon were repaired with heavy nonabsorbable sutures. For the repair, a modified

• Received: July 31, 2006 Accepted: February 14, 2007

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Figure 1. Preoperative MRI revealed that continuity of patellar tendon was interrupted.

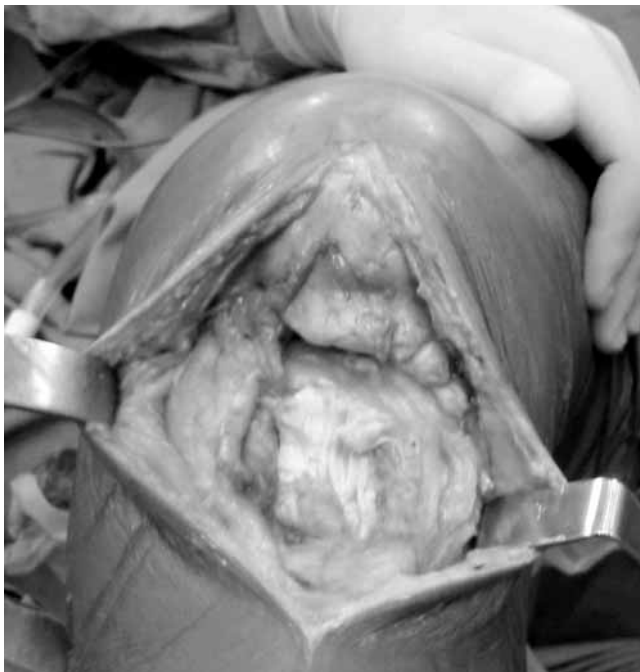


Figure 2. Level of transection was 2 cm below the inferior pole. The fibrotic tissue between the tendon ends was removed.

Kessler core suture was placed which was supported with interrupted simple stitches. A second incision was made at the lateral aspect of the thigh and an approximately 20 cm long and 15 mm wide strip of iliotibial band was released proximally and elevated leaving the insertion intact. Two bony tunnels -one at the area of tuberositas tibia and one at the inferior third of the patella- were created. The strip was first passed through the tibial tunnel from lateral to medial and then through the patellar tunnel from medial to lateral; thus forming a loop around the patellar tendon. The strip was also sutured to the tendon on both sides (Figure 3).

Verification of tendon length was accomplished according to preoperative measurements of contralateral

knee. Intraoperatively, 90° knee flexion was tested many times without any signs of failure of the repair. The patient was put on “Continuous Passive Motion” machine starting at the first postoperative day. He had 90° of passive flexion and full extension at 15th day and active range of motion exercises were started. He was allowed for complete weight bearing after he had achieved straight leg raising. He regained active full range of motion 8 weeks postoperatively and strengthening exercises were started. He returned to his job 16 weeks postoperatively. At the latest visit at 22 months, he had a 1.0 cm of thigh atrophy at the injured side while extensor power with manual testing was equal to the opposite. Continuity of the tendon was also demonstrated with MRI (Figure 4). Insall-Salvati index was measured to be the same as the unaffected knee.



Figure 3. After the primary repair had been completed and drill holes had been prepared, the iliotibial band strip was looped around patellar tendon.



Figure 4: 22 months postoperatively, structural integrity of patellar tendon was confirmed with MRI.

DISCUSSION

To our knowledge, this is the first report of a patient with neglected transection of the patellar tendon. Previous reports on neglected cases of patellar tendon rupture all have emphasized the difficulty of salvaging the problem. Siwek and Rao^[4] have termed the repairs as delayed when performed 2 weeks after injury and results of these cases have been worse than the immediate repairs. Although primary repair with cerclage augmentation has been the most commonly used method for acute ruptures^[1,2,5] repairs without augmentation have also been reported.^[6] For neglected cases, on the other hand, surgical technique and postoperative rehabilitation are more challenging. Preoperative traction, autograft or allograft augmentation, patellotibial transfixation and postoperative immobilization or delayed rehabilitation are the treatment modalities.^[1,3,4,7]

This case is different from a patellar tendon rupture in two ways: The tendon was otherwise healthy and injury of the patellar retinaculum was not extensive. Accordingly, although it was a neglected case, there was no need for lowering the patella since it had not migrated proximally, but tendon length was again carefully checked especially to prevent over tightening. Nevertheless, it was a complete patellar tendon transection and the repair should have been strong enough to bear the forces generated by the motion of the knee and pull of the quadriceps mechanism. Ravalin et al^[8] reported biomechanical properties of patellar tendon repairs and concluded that augmentation is mandatory if early active motion is sought after. We decided to augment the repair in a way that allows early aggressive rehabilitation, while obviating the potential complications of internal hardware. A long strip of iliotibial band was the preferred graft. Preserving its insertion at Gerdy's tubercle, the graft was passed through holes in tibia and patella thus forming a patellotibial cerclage.

Wires have been most commonly used for protecting patellar tendon repairs in both acute and chronic settings^[3,5,9]. While they successfully protect the repairs, they are not devoid of complications and necessitate at least a second operation for removal.^[10,11] Autogenous grafts on the other hand have most commonly been used for late ruptures to structurally augment the tendon and have again been protected with cerclage wires or prolonged immobilization.^[4,7,12] While strips of fascia lata and semitendinosus tendon have been used as autografts, the latter has been reported to be stronger mechanically.^[13] Good results however, have been reported for both grafts.^[4,12] Larson and Simonian^[14] and Jarvela et al^[15] have reported that augmentation of acute ruptures with semitendinosus

tendon had allowed immediate and improved rehabilitation. However, possibility of loosing knee flexor power and range of flexion has been a concern.^[15]

Iliotibial band autografts have also successfully been used for the reconstruction of the anterior cruciate ligament deficient knees.^[16,17] Noyes et al^[13] has found that the maximum load/unit width for distal iliotibial tract and fascia lata were 44 ± 6 N/mm and 39 ± 2 N/mm respectively. The strength of our 15 mm wide graft may be considered to be doubled since the strip had looped around the patella. Ravalin et al^[8] has used an extension model simulating the moment at the knee of a 70 kg person and reported that loads applied to the quadriceps tendon were always less than 250 N, which we think to be well below the strength of the iliotibial band strip used for our 82 kg patient.

We used the fascial strip for the purpose of protecting our repair; i.e. a sort of patellotibial transfixation. Postoperatively this technique proved to be secure enough to allow an intensive and load bearing rehabilitation program without immobilization and 90° of passive motion at second week. We think that the repair of the patellar tendon and cerclage with a strip of iliotibial band may be a viable technique especially for salvage of acute ruptures. While this may cause donor site morbidity, it protects the patient from possible complications as infection, wire irritation or breakage and second operation for removal.

REFERENCES

1. Matava MJ. Patellar tendon ruptures. *J Am Acad Orthop Surg* 1996;4:287-96.
2. Persson K, Merkow RL, Templeman DC, Sieber J, Gustilo RB. Patellar tendon rupture. Description of a simplified operative method for a current therapeutic problem. *Arch Orthop Trauma Surg* 1992;112:47-9.
3. Casey MT Jr, Tietjens BR. Neglected ruptures of the patellar tendon. A case series of four patients. *Am J Sports Med* 2001;29:457-60.
4. Siwek CW, Rao JP. Ruptures of the extensor mechanism of the knee joint. *J Bone Joint Surg Am* 1981;63:932-7.
5. Giles SN, Morgan-Jones R, Brown MF. The use of hinged Kirschner wires for fixation of patellar tendon rupture. *Injury* 1999; 30: 539-40.
6. Marder RA, Timmerman LA. Primary repair of patellar tendon rupture without augmentation. *Am J Sports Med* 1999; 27: 304-7.
7. Shepard GJ, Christodoulou L, Hegab AI. Neglected rupture of the patellar tendon. *Arch Orthop Trauma Surg* 1999; 119: 241-2.
8. Ravalin RV, Mazzocca AD, Grady-Benson JC, Nissen CW, Adams DJ. Biomechanical comparison of patellar tendon repairs in a cadaver model: an evaluation of gap formation at the repair site with cyclic loading *Am J Sports Med* 2002;30:469-73.
9. Mickelsen PL, Morgan SJ, Johnson WA, Ferrari JD. Patellar tendon rupture 3 years after anterior cruciate ligament

- reconstruction with a central one third bone-patellar tendon-bone graft. *Arthroscopy* 2001;17:648-52.
10. Bhargava SP, Hynes MC, Dowell JK. Traumatic patella tendon rupture: early mobilization following surgical repair. *Injury* 2004;35:76-9.
 11. Kinmont JC, Walter E, Curtis MJ. Augmentation of patellar tendon repair with poly-p-dioxanone cord. *Injury* 2002;33:263-4.
 12. Cadambi A, Engh GA. Use of a semitendinosus tendon autogenous graft for rupture of the patellar ligament after total knee arthroplasty. A report of seven cases. *J Bone Joint Surg [Am]* 1992;74:974-9.
 13. Noyes FR, Butler DL, Grood ES, Zernicke RF, Hefzy MS. Biomechanical analysis of human ligament grafts used in knee-ligament repairs and reconstructions. *J Bone Joint Surg Am* 1984;66:344-52.
 14. Larson RV, Simonian PT. Semitendinosus augmentation of acute patellar tendon repair with immediate mobilization. *Am J Sports Med* 1995;23:82-6.
 15. Jarvela T, Halonen P, Jarvela K, Moilanen T. Reconstruction of ruptured patellar tendon after total knee arthroplasty: a case report and a description of an alternative fixation method *The Knee* 2005;12:139-43.
 16. Bak K, Jorgensen U, Ekstrand J, Scavenius M. Results of reconstruction of acute ruptures of the anterior cruciate ligament with an iliotibial band autograft. *Knee Surg Sports Traumatol Arthrosc* 1999;7:111-7.
 17. Jorgensen U, Bak K, Ekstrand J, Scavenius M. Reconstruction of the anterior cruciate ligament with the iliotibial band autograft in patients with chronic knee instability. *Knee Surg Sports Traumatol Arthrosc* 2001;9:137-45