

Chronic Rupture of the Extensor Apparatus of the Knee Joint

P M Poonnoose, MS Orth, R J Korula, MS Orth, A T Oommen, MS Orth

Department of Orthopaedics, Unit 2, Christian Medical College, Vellore, 632 002, India

Summary

Chronic ruptures of the extensor mechanism of the knee are uncommon injuries, and previously reported literature assumes the presence of an intact patella for repair. We present a case of chronic rupture following patellectomy done twelve years previously. The defect in the extensor apparatus was extensive (18cm), and this was bridged using a large fascia lata graft from the opposite thigh, with reasonably successful results.

Key Words: Patellectomy, Quadriceps tendon rupture, Extensor expansion rupture, Extensor mechanism rupture, Iliotibial band

Introduction

Chronic extensor mechanism rupture is an uncommon injury of the knee joint. Acute ruptures have been successfully repaired by augmentation with autogenous tissue, allograft tendons, and other synthetic materials¹. Most of these procedures depend on an intact patella to anchor the repair. We present an unusual case of a patient who presented with an extensive (18cm) defect in the extensor apparatus 12 years following rupture of the extensor mechanism after patellectomy.

Case Report

A 50-year-old man sustained a comminuted patellar fracture in 1990, which was treated at another centre with a patellectomy. The knee was braced in a cast post operatively for a month. Two days following the removal of the cast, he tripped and fell, rupturing the extensor mechanism. As a result, he was unable to ambulate without the aid of a stick. For twelve years he was unable to farm his fields, as he was not able to walk on uneven grounds. His main wish was for stability at the knee joint, even if it was at the expense of range of motion, as he desired to return to his

occupation of farming. On pre-operative evaluation, though the passive range of the knee joint was complete, active extension was not possible. There was no activity of the quadriceps on attempted contraction. He was unable to stand on one leg or walk on uneven ground without an aid. After an informed consent, it was decided to perform a reconstruction using the opposite side iliotibial (IT) band.

A midline skin incision was made, and the defect in the extensor apparatus defined. An 18cm gap was present between the ruptured end of the quadriceps tendon and the tibial tuberosity, with no remnant of the patellar tendon. The ruptured quadriceps tendon was identified, and the interval between the vastus intermedius and the rectus defined (Fig 1). The quadriceps tendon, the vastus medialis, and the lateralis were then mobilized off the femur. A 26cm band of the IT was harvested from the opposite thigh -8cm broad distally, and 10cm broad proximally. The graft was split proximally and distally for a distance of 4 cm in the midline. The IT band was placed in the defect, with the shiny aponeurotic surface facing the joint. The proximal split portion was routed through the interval

This article was accepted: 28 March 2005

Corresponding Author: P M Poonnoose, Department of Orthopaedics, Unit 2, Christian Medical College, Vellore, 632 002, India

CASE REPORT

between the rectus and intermedius, and sutured on itself on either side. Distally a 6mm hole was drilled at the tibial tuberosity, and the distal split portions of the IT band were rolled and passed through it. They were then sutured back onto the IT band on either side (Fig 2). The mobilized vastus lateralis and medialis were then sutured on to the IT band proximally. The post-operative range of movement was 0-90 degrees.

Post operatively, the knee was mobilized through short arcs passively for a week, to prevent adhesions at the knee joint and then immobilized in a cast with the knee

in 20 degrees of flexion for 4 weeks. The knee was then mobilized with gradual stretches, and quadriceps strengthening. At 9 months follow up, the patient had a range of 0-120 degrees, and was able to squat on the floor. He was able to lift a 2.5-pound weight against gravity and was able to stand on one leg without support (Fig 3). He had started farming his lands again by himself. He however had an extension lag of 40 degrees. We advised him to wear a brace to prevent accidental buckling of the knee, but the patient was not keen on doing so, as he felt reasonably confident while walking.



Fig. 1: 18cm defect in the extensor expansion bridged by a thin film of fibrous tissue. The scissors is placed in the interval between the rectus and the vastus intermedius

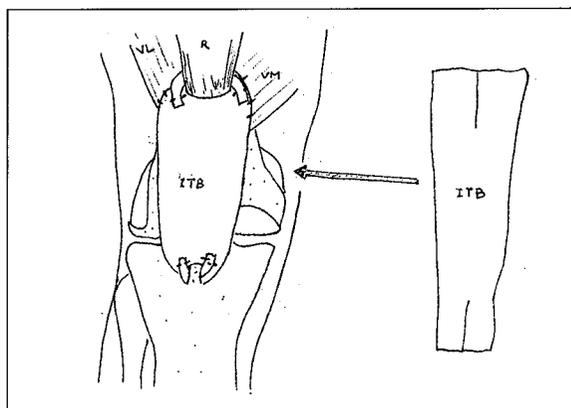


Fig. 2: The proximal portion of the IT band was split and routed through the interval between the rectus and intermedius. Distally, the split portions of the IT band were passed through a drill hole in the tibial tuberosity and sutured on itself. [VM- Vastus medialis; VL- Vastus Lateralis; ITB- Iliotibial band]

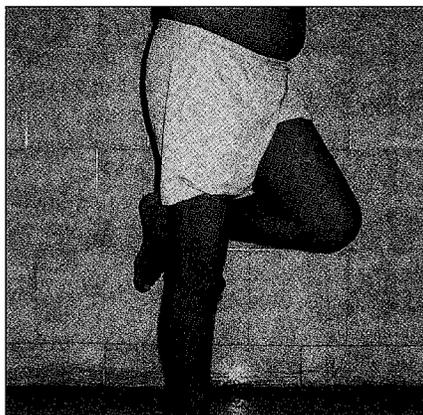


Fig. 3: Nine months following surgery, the patient was able to stand on one leg without support.

Discussion

Patella tendon rupture is usually seen in patients younger than 40 years of age, and is usually traumatic in nature. Neglected ruptures have been treated with autogenous hamstring grafts (semitendinosus, and gracilis), gastrocnemius flaps², allograft tendons (Achilles tendon), and with synthetic material like Dacron and merciline tapes¹. Pan et al reported the successful use of the IT band in the reconstruction of the patellar tendon³. Tendo-achillis allografts have also been used successfully to treat extensor mechanism ruptures in patients with total knee replacement¹.

Rupture of the quadriceps tendon on the other hand, usually occurs in older individuals with systemic disorders like SLE, diabetes, gout, hyperparathyroidism, uremia and obesity⁴. These may be repaired by direct closure, but often require reinforcement with local flaps, using techniques such as described by Scuderi et al⁴. Neglected ruptures that cannot be approximated are treated with Codvilla's tendon lengthening procedures⁴. Defects of 2.5 -5 cm have been bridged using the fascia lata⁴. All these techniques depend on an intact patella to transmit the forces across the knee following repair.

Following patellectomy, there is a loss of quadriceps strength, with quadriceps atrophy, and occasional ligamentous instability. To reduce this problem, it is often necessary to perform plastic repair of the

quadriceps mechanism, using techniques such as the one described by West and Soto-Hall⁴. Repair following a chronic rupture is a challenging problem due to muscle retraction, and protracted muscle inactivity. There has been only one other case report of a repair of chronic quadriceps mechanism rupture following patellectomy - where the authors used a Tendo-achillis allograft to bridge the defect¹.

At the time of surgery, the muscles were mobilized adequately off the femur, and the graft hooked around the rectus-intermedius junction of the quadriceps tendon. As a result, there was good excursion of the muscles as they were stretched during passive and active movement at the knee joint. The case report presented above is unusual in that the defect in the extensor mechanism was extensive (20 x 8cm). Further, the quadriceps muscle that had been inactive for 12 years, regained sufficient power following repair of the defect, enabling the patient to restart farming.

Conclusion

In neglected ruptures of the extensor mechanism following patellectomy, it is possible to bridge extensive defects using grafts from the IT band. Adequate strength and range of motion can be achieved to improve the patient's functional ability. This method of bridging defects in the extensor mechanism is a useful one - especially in countries where there is difficulty in obtaining allografts.

References

1. Wascher DC, Summa CD. Reconstruction of chronic rupture of the extensor mechanism after patellectomy. *Clin Orthop* 1998; 357: 135-40.
2. Babu NV, Chittaranjan S, Abraham G, et al. Reconstruction of the quadriceps apparatus following open injuries to the knee joint using pedicled gastrocnemius musculotendinous unit as a bridge graft. *Br J Plast Surg* 1994; 47(3); 190-93.
3. Pan KL, Masbah O, Razak M. Late reconstruction of the patellar tendon. *Med J Malaysia* 2001; 56 Suppl C: 73-75.
4. Sports Medicine. In: Canale T (Ed). *Campbell's Operative Orthopaedics, Part XIII, Vol 3, (10th ed)*. St Louis, Missouri: Mosby, Inc. 2003; 2392-477.