



Femoral Quadriceps Tendon Closure Failure After Total Knee Arthroplasty

Takatomo Mine*, Koichiro Ihara, Hiroyuki Kawamura, Ryutaro Kuriyama and Ryo Date

Department of Orthopaedic Surgery, National Hospital Organization Kanmon Medical Center, Simonoseki, Japan

Abstract

Extensor mechanism disruption after total knee arthroplasty is rare. Extensor mechanism disruption can occur either intraoperatively or postoperatively. We present our first case a femoral quadriceps tendon closure failure in a medial parapatellar approach. Two causes might explain the failure of the femoral quadriceps tendon closure. One is insufficient sutures in the closure of the medial parapatellar approach. The other might be the effect of a local periarticular injection. A torn tendon was refreshed and performed tightly with heavy nonabsorbable sutures. A successful repair was obtained.

Keywords: Total knee arthroplasty; Extensor mechanism disruption; Failure of soft tissue closure

Introduction

Many complications after total knee arthroplasty (TKA) have been reported. Extensor mechanism disruption is rare and sometimes reported as a complication in revision TKA [1-3]. The extensor mechanism includes the femoral quadriceps tendon, the patella, the patellar tendon, and the tibial tubercles. It has been reported that extensor rupture occurs in 0.17% to 2.5% of TKA cases [4-6]. The rupture can occur either intraoperatively or postoperatively. The division of arteries during TKA can exacerbate the compromise to the blood supply and weaken the extensor mechanism. We present our first case of a femoral quadriceps tendon closure failure in a medial parapatellar approach.

Case Presentation

A 71-year-old man presented with severe right knee pain and gait disturbance. The patient had right TKA 6 years ago. After the operation, there had been no symptoms. He had mild pain in the left knee 1 year ago. The pain worsened, and therefore, he came to our department to undergo left TKA.

As for the physical findings, swelling and tenderness were observed on the left side. The range of motion (ROM) was limited from 5° to 135°. The patellofemoral joint had no problems. There was no significant muscle weakness of the lower limbs.

The hip-to-ankle standing X-ray image demonstrated a Kellgren-Lawrence OA grade 4. The anatomical lateral distal femoral angle (FTA) was 187°.

TKA was performed using a Balance Knee System PS type (Japan Medical Dynamic Marketing) with cement (Figure 1). The patella was not replaced. To prevent severe pain after the operation, a local periarticular injection was performed. After the operation, ROM exercise and partial weight bearing were started. However, swelling and fluctuation above the patella of the right knee was observed. We considered these symptoms to be due to subcutaneous bleeding. Puncture to part of the fluctuation was performed. Blood effusion was drained; however, symptoms got worse. Two months after the surgery, extension lag appeared gradually and the ROM was from 0° to 120° with an extension lag of 20°. It was suggested that soft tissue closure failure had occurred. MRI revealed soft tissue closure failure in the femoral quadriceps tendon (Figures 2A and 2B). A reoperation was performed. In the operative findings, the femoral quadriceps tendon in the medial parapatellar approach was torn and had failed to be closed. The torn tendon was refreshed and closed tightly with heavy nonabsorbable



Figure 1: Postoperative radiograph showing TKA.

sutures with ethibond excel (Johnson & Johnson). After the operation, a knee brace was put on the right leg for 2 weeks. ROM exercise and partial weight bearing were started. Three months after the operation, the ROM was from 0° to 120°. The quadriceps' strength was normal in comparison to the right knee. MRI revealed repair of soft tissue closure in the femoral quadriceps tendon (Figure 3).

Discussion

Extensor mechanism disruption is rare and causes a deficit of active knee extension as well as impaired knee function. The extensor mechanism includes the quadriceps tendon, the patella, the patellar tendon, and the tibial tubercles. Quadriceps tendon rupture results from a traumatic episode. It has been reported that there are many etiological

*Corresponding author: Takatomo Mine, Department of Orthopaedic Surgery, National Hospital Organization Kanmon Medical Center, Simonoseki, Japan, Tel: +81-83-241-1199; Fax: +81-83-241-1301; E-mail: minet@kanmon-mc2.hosp.go.jp

Received June 13, 2017; Accepted July 11, 2017; Published July 20, 2017

Citation: Mine T, Ihara K, Kawamura H, Kuriyama R, Date R (2017) Femoral Quadriceps Tendon Closure Failure After Total Knee Arthroplasty. Orthop Muscular Syst 6: 237. doi:10.4172/2161-0533.1000237

Copyright: © 2017 Mine T, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

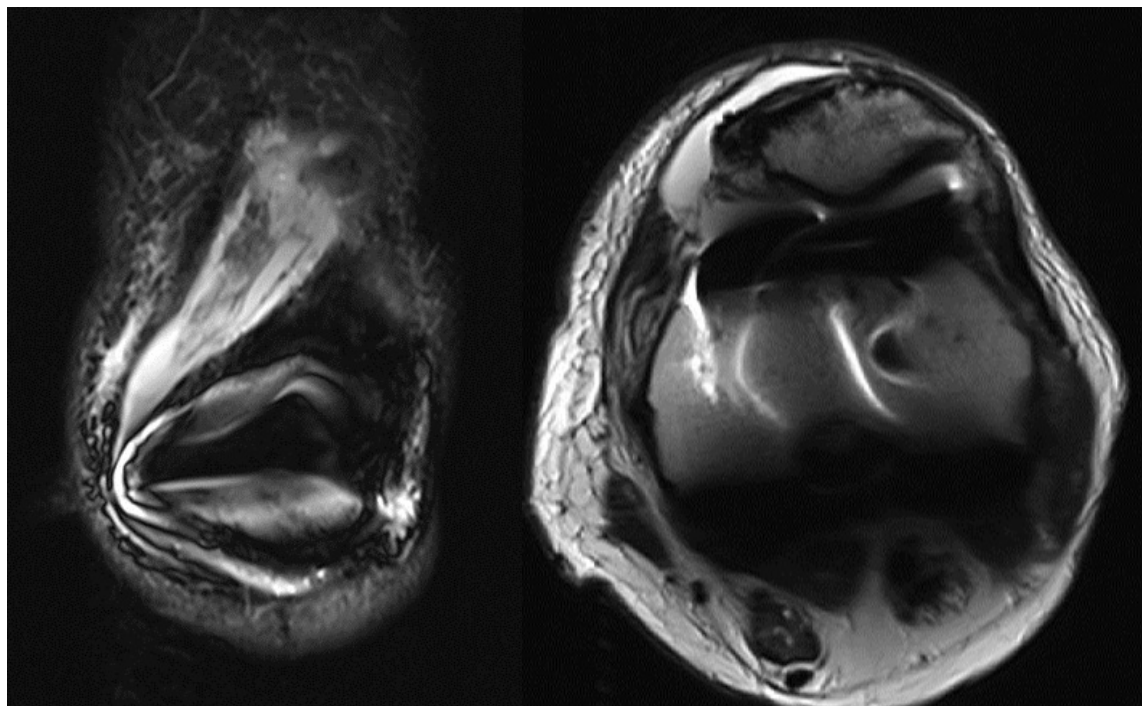


Figure 2: Post-operative MRI at 2 months showing the failure of closure in femoral quadriceps tendon portion. A) Coronal T2-weighted image. B) Axial T2-weighted image.

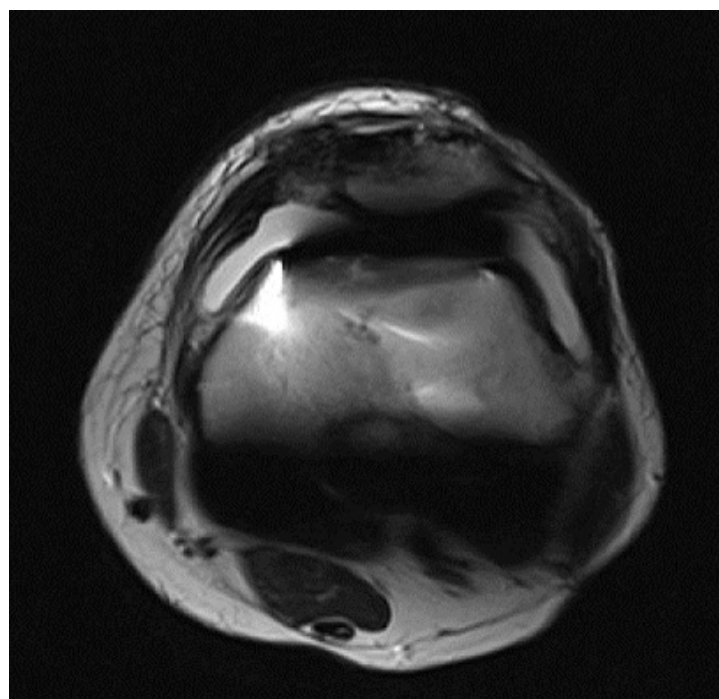


Figure 3: Post-reoperative MRI at 3 months axial T2-weighted image.

factors contributing to the disruption after TKA. Dobbs reported that the arthrotomy used to expose the joint in patients undergoing TKA could in fact impair the blood supply to the tendon [5]. Parker reported that component misalignment or joint-line elevation can result in

impinging of the tendon, predisposing it to a partial or total tear [7]. We reported a femoral quadriceps tendon closure failure in a medial parapatellar approach. We have never before experienced a closure failure of the femoral quadriceps tendon. It is necessary to select the best

surgical option for the closure of the femoral quadriceps tendon. The quality of the remaining tendon and the integrity of the surrounding soft tissue are very important. Pagnano reported that augmentation of the repair with different grafts might enhance the healing process and strengthen the repaired structure in cases where the injured tissue has retracted because of degenerative processes [8]. In this case, the injured tissue had relatively good blood supply 2 months after TKA. As the tear pattern was longitudinal along the medial parapatellar approach, the suture repair showed a good outcome.

We suggest two possible causes of the closure failure of the femoral quadriceps tendon. One is that insufficient sutures were used in the closure of the medial parapatellar approach. The other might be the effect of the local periarticular injection. The local periarticular injection included morphine sulfate, epinephrine, corticosteroid, and NSAID. Vashiya and Koh reported that local infiltration analgesia reduced pain, and that no major complications occurred [9,10]. Mirzai and Glasser reported that corticosteroids decrease post-surgical pain by reducing the production of prostaglandins and increasing vasodilation when injected directly into the surgical wound [11,12]. Local periarticular injection has begun to be used in our hospital since one year ago. In the current case, the analgesic solution was directly injected into the quadriceps tendon due to fear of bleeding from the tendon. Whether the analgesic solution should be injected into the extensor mechanism is controversial. Chia reported that there is a risk of delayed tendon rupture by injecting the extensor mechanism [13]. Direct injection into the quadriceps tendon might prevent healing of the sutures in the femoral quadriceps tendon. Now the analgesic solution is not directly injected into the quadriceps tendon.

References

1. Barrack RL, Stanley T, Allen BR (2003) Treating extensor mechanism disruption after total knee arthroplasty. *Clin Orthop Relat Res* 416: 98-104.
2. Crossett LS, Sinha RK, Sechriest VF, Rubash HE (2002) Reconstruction of a ruptured patellar tendon with achilles tendon allograft following total knee arthroplasty. *J Bone Joint Surg Am* 84: 1354-1361.
3. Vaishya R, Agarwal AK, Vijay V (2016) Extensor mechanism disruption after total knee arthroplasty: A case series and review of literature. *Cereus* 8: e479.
4. Schoderbek RJ, Brown TE, Mulhall KJ, Mounasamy V, Iorio R, et al. (2006) Extensor mechanism disruption after total knee arthroplasty. *Clin Orthop Relat Res* 446: 176-185.
5. Dobbs RE, Hanssen AD, Lewallen DG, Pagnano MW (2005) Quadriceps tendon rupture after total knee arthroplasty. Prevalence, complication, and outcomes. *J Bone Joint Surg Am* 7(1): 37-45.
6. Lynch AF, Rorabeck CH, Bourne RB (1987) Extensor mechanism complications following total knee arthroplasty. *J Arthroplasty* 2: 135-140.
7. Parker DA, Dunbar MJ, Rorabeck CH (2003) Extensor mechanism failure associated with total knee arthroplasty: Prevention and management. *J Am Acad Orthop Surg* 11: 238-247.
8. Pagnano MW (2003) Patellar tendon and quadriceps tendon tears after total knee arthroplasty. *J Knee Surg* 16: 242-247.
9. Vaishya R, Wani AM, Vijay V (2015) Local infiltration analgesia reduces pain and hospital stay after primary TKA: randomized controlled double blind trial. *Acta Orthop Belg* 81: 720-729.
10. Koh IJ, Kang YG, Chang CB, Do SH, Seong SC, et al. (2012) Does periarticular injection have additional pain relieving effects during contemporary multimodal pain control protocols for TKA? A randomised, controlled study. *Knee* 19: 253-259.
11. Mirzai H, Tekin I, Alincak H (2002) Perioperative use of corticosteroid and bupivacaine combination in lumbar disc surgery: A randomized controlled trial. *Spine* 17: 343-346.
12. Glasser RS, Knego RS, Delashaw JB, Fessler RG (1993) The perioperative use of corticosteroids and bupivacaine in the management of lumbar disc disease. *J Neuro Surg* 78: 383-387.
13. Chia SK, Wernecke GC, Harris IA, Bohn MT, Chen DB, et al. (2013) Periarticular steroid injection in total knee arthroplasty: a prospective, double blinded, randomized controlled trial. *J Arthroplasty* 28: 620-623.