



Case report

Knee osteoarthritis with patellar dislocation treated by total knee arthroplasty using a lateral parapatellar approach—ingenuity of exposure and closure

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ABSTRACT

Knee osteoarthritis with patellar dislocation is a rare and difficult-to-treat condition. Several reports of total knee arthroplasty (TKA) combined with various realignment procedures have been published. A 77-year-old man with knee pain was referred to our hospital. Plain radiography revealed a laterally dislocated patella, with osteoarthritic changes in the femorotibial joint. He simply underwent TKA via a lateral parapatellar approach without realignment. We devised methods of exposure and closure to maximize the effect of lateral release by the lateral parapatellar approach. TKA using the lateral parapatellar approach might be effective in treating knee osteoarthritis with patellar dislocation.

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Introduction

Knee osteoarthritis (OA) with patellar dislocation (PD) is a rare condition that is difficult to treat. There have been some reports of total knee arthroplasty (TKA) combined with various realignment procedures [1–3], which may require rehabilitation restrictions and may cause complications [4,5].

The lateral approach is a technique used for valgus knees. There have been a few reports on using this lateral approach in cases of knee OA with PD. Lateral release is always necessary in cases of knee OA with PD even when performing various realignment

procedures. Using the lateral approach, when performing TKA, is itself a lateral release.

Herein, we report a case of knee OA with PD that could be treated simply with TKA alone using a lateral parapatellar approach to devise both exposure and closure methods.

Case report

Patient background

A 77-year-old man who experienced bilateral knee joint pain since childhood was referred to our hospital because of worsening pain of the right knee. The patient had no history of trauma or previous surgical procedures of both knees. The range of motion of the right knee was 0°–120°, and the extension lag was 10°. Plain radiography showed that the right patella was dislocated laterally, the patella-femoral (PF) joint was classified as grade IV, and the femorotibial joint had grade III osteoarthritic changes according to the Kellgren-Lawrence classification with 3° of mild valgus in the hip-knee-ankle angle (Fig. 1).

The patient was informed that data from the case would be submitted for publication and gave their consent.

Declaration of interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

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Exposure

A midline longitudinal incision was made to expose the extensor mechanism. We cut only through the lateral retinaculum, leaving the deep layer of the joint capsule. The lateral retinaculum was then separated from the deep layer of the joint capsule, and the deep layer of the joint capsule was incised at the base of the femur and flipped forward to be preserved. Consequently, the deep layer of the joint capsule was preserved on the lateral edge of the patella with a width of approximately 3 cm.

Total knee arthroplasty

TKA for the right knee was performed using an Attune PS fixed-bearing type (DePuy, Warsaw, IN) with intraoperative Navigation (Kolibri; BrainLAB). Regarding resection of the proximal tibia, we used a jig for the left knee. However, the rest of the surgery was performed in the same way as a standard medial parapatellar approach. Coronal alignment was targeted for neutral mechanical alignment. Femoral implant rotation was targeted for surgical transepicondylar axis.

Moreover, tibial implant rotation was targeted for Akagi's line, which is the line connecting the middle of the posterior cruciate ligament to medial border of the patellar tendon, representing the anterior-posterior axis of the tibia [6]. The patella was resurfaced using a dome-type patellar component because there was severe cartilage damage to the patella and hypoplasia of the central ridge.

Closure

We used a tourniquet until the implant was placed. After implantation, we then removed the tourniquet and started closure. We confirmed patellar tracking using surgical navigation, where patellar movements were depicted as trajectories in the femoral implant. The vastus lateralis was sutured to its original site. Although patellar tracking was good in this state, the patella was laterally displaced when the lateral retinaculum was sutured to its original site (Fig. 2b). However, the PD was less than that observed before surgery by TKA surgery alone (Fig. 2a). Although there was a gap between the cut edge of the retinaculum at 90° flexion of the knee joint (Fig. 3a), the cut edges of the lateral retinaculum and of



Figure 1. Preoperative radiographs. (a) Plain X-P standing anteroposterior: valgus deformity of hip-knee-ankle angle 3°. (b) Plain X-P lateral view. (c) Plain X-P skyline view: The patella is laterally dislocated. (d) CT axial view: Trochlear dysplasia and patella hypoplasia can be seen. CT, computed tomography.

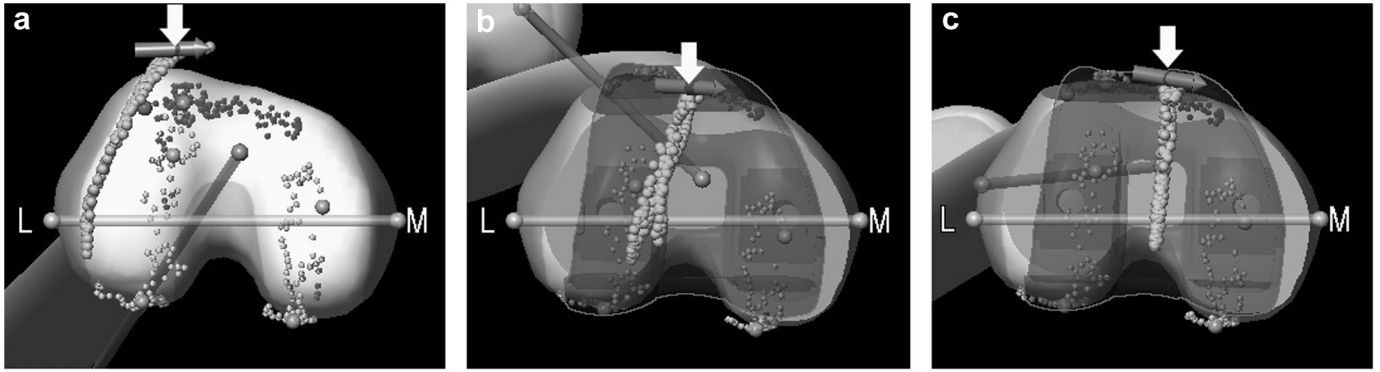


Figure 2. Patella tracking in navigation (a) before TKA, (b) when the lateral retinaculum is sutured to the original site, (c) when the cut edge of the lateral retinaculum and the cut edge of the preserved deep layer of the joint capsule were sutured. White arrow: patella. TKA, total knee arthroplasty.

the preserved deep layer of the joint capsule were sutured without tension. In this state, patellar tracking was confirmed to be good by the no-thumb test and navigation (Fig. 2c). Finally, the lateral capsule-retinaculum was completely reformed, without exposing the implant (Fig. 3b).

Postoperative course

After surgery, rehabilitation was provided without any restrictions. At 18 months postoperatively, no dislocation of the patella was observed (Fig. 4). Knee range of motion improved to 0°-125°, and the extension lag resolved. The Knee Society rating system knee score improved from 44 to 99 points, functional score improved from 15 to 50 points, and the Hospital for Special Surgery patella score improved from 50 to 95 points.

Discussion

Knee OA with PD is a rare condition that is difficult to treat. There are no established treatment methods. However, various methods have been reported. Most cases might be treated with TKA combined with various realignment procedures [1-3]. Currently, knee OA with PD can be treated simply by performing TKA using the lateral parapatellar approach. We devised methods of exposure and closure to maximize the effect of lateral release with a lateral parapatellar approach. Therefore, the reason for the realignment procedure was not needed.

There have been only a few reports of knee OA with PD that was simply treated with TKA with a lateral parapatellar approach [7,8]. Most cases were treated with TKA combined with various realignment methods of the extensor mechanism, such as proximal realignment [1], medial patellofemoral ligament reconstruction (MPFLR) [2], and tibial tubercle osteotomy [3]. We also reported a case of TKA with proximal realignment [9]. Realignment procedures require rehabilitation restrictions [1-3] and may result in complications [4,5]. As valgus deformity is a typical form of knee OA with PD [10], the lateral parapatellar approach is, theoretically, suitable for such cases. However, the lateral parapatellar approach is not commonly used because of its unfamiliarity among surgeons and the poorer visual field than the medial parapatellar approach. We usually perform a lateral parapatellar approach for valgus knees with a hip knee ankle angle of 10 degrees or more, even with no PD. The disadvantage of the lateral approach is the method of wound closure. Correcting a valgus deformity with TKA can always result in increased tension of the lateral PF soft tissues. Suturing without tension would create a defect, and forcing the sutures would increase the pressure on the PF joint. Therefore, our ingenuity with these exposure and closure methods might be useful. Lateral release is a necessary procedure for treating knee OA with PD in all cases. A lateral approach is itself a lateral release. In cases treated with TKA using the medial parapatellar approach, excessive lateral release may cause vascular compromise [11]. However, insufficient lateral release may even result in recurrent dislocation [5]. Therefore, as the lateral approach preserves blood flow from the medial side, sufficient lateral release can be completed without

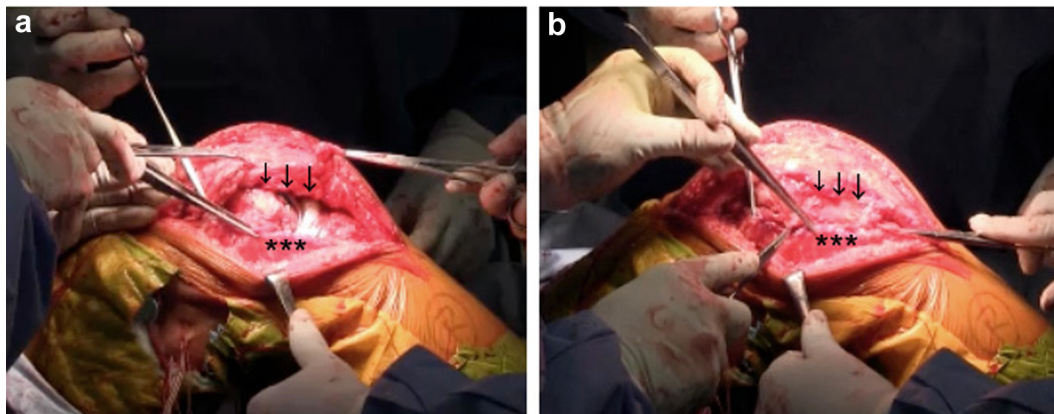


Figure 3. Intraoperative photo (a) before closure: There is a gap between the cut edge of retinaculum. (b) After closure: The gap was completely covered with deep layer of the capsule with no tension. Black arrow: lateral edge of the patella; asterisk: cut edge of retinaculum.

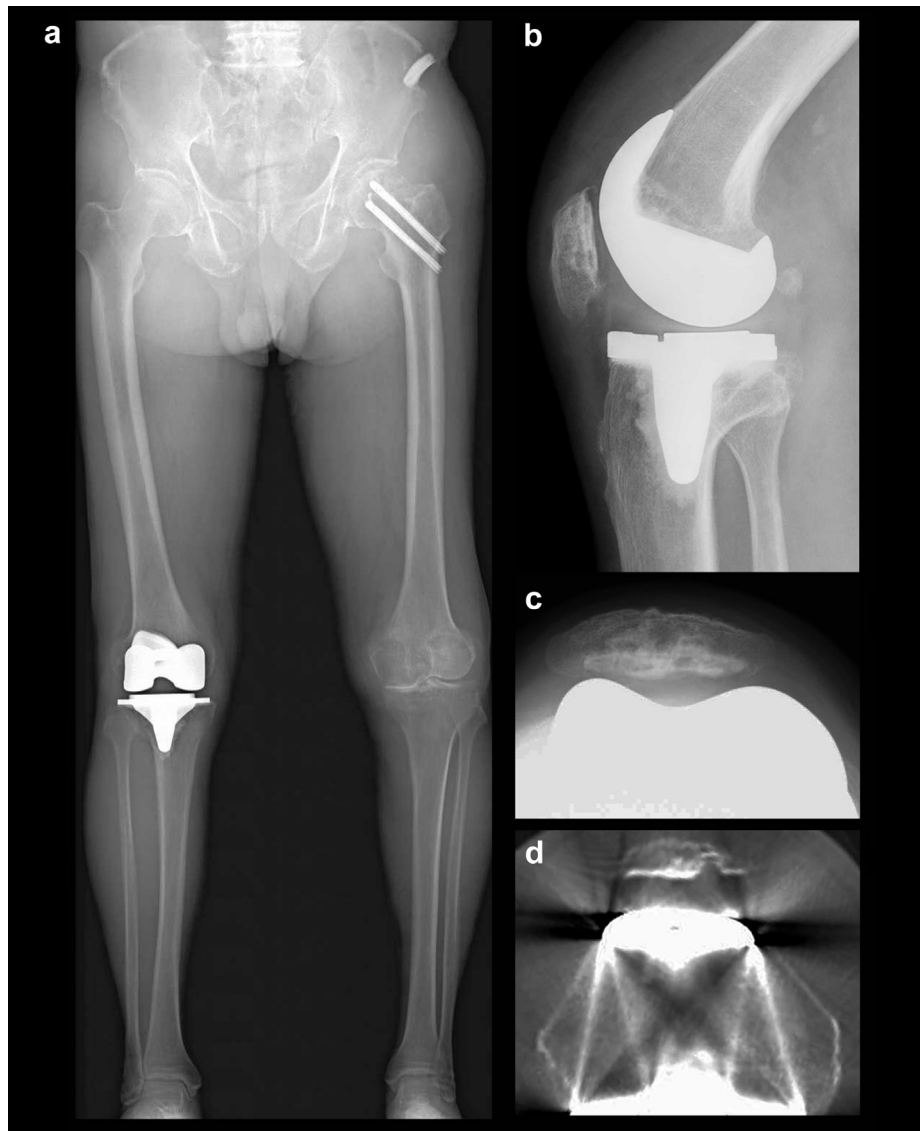


Figure 4. Postoperative radiograph. (a) Plain X-P standing AP. (b) Plain X-P lateral view. (c) Plain X-P skyline view. (d) CT axial view: Patella is not dislocated. CT, computer tomography.

complications. To the best of our knowledge, there have been only two reports on using the lateral approach for knee OA with PD. Hau and Newman reported 12 cases of knee OA with PD treated with this lateral approach [7]. However, MPFLR and tibial tubercle osteotomy have been added to most cases, and the degree of lateral release and the methods of exposure and closure remain unknown [7]. Fujiwara et al. reported a case similar to ours that could be treated simply with TKA using a lateral approach [8]. However, they only described the closure method as follows: “The gap of the lateral capsule is to be covered by soft tissue such as the infrapatellar fat pad or the lateral meniscus” [8].

In the present case, knee OA with PD could be treated simply with TKA using the lateral parapatellar approach. This is because the exposure and closure methods were devised to maximize the effect of lateral release using the lateral parapatellar approach. Even if the lateral approach is used, the degree of lateral release may differ depending on the closure method. In other words, if the wound is closed as before surgery, a lateral release cannot be completed. However, if the wound is not closed, the implant would be exposed under the skin, and risks of infection might increase. By examining kinematics using navigation, we were able to confirm

that the effect of lateral release changes depending on the difference in closure (Fig. 2). We incised the lateral retinaculum and deep fascia at different sites during exposure and shifted and sutured them at closure. In this way, a new lateral retinaculum was formed (lateral retinacular plasty). This method might provide complete lateral release and allows for complete joint closure. The lateral parapatellar approach was reported by PA Keblish as an approach to TKA for the valgus knees [12]. He also reported a method similar to ours called “coronal plane Z-plasty” [12].

In this case, we could treat knee OA with PD simply with TKA using a lateral parapatellar approach by devising the exposure and closure methods. However, it is unclear whether all cases could be treated with this procedure. Bony predisposing factors of dislocation, such as trochlear dysplasia and patella hypoplasia, are often seen in cases of knee OA with PD. TKA can correct these bony predisposing factors [7]. It was confirmed by navigation that the PD was reduced with just TKA compared to its state before surgery (Fig. 2a and b). Therefore, in many cases, realignment of the extensor mechanism can be completed by improving the abnormal soft-tissue balance by lateral release. However, if patellar tracking is not good even after this procedure, proximal realignment or MPFLR

could be performed. TKA using a lateral parapatellar approach might be the first-line treatment option for knee OA with PD.

Summary

Knee OA with PD is a rare condition that is difficult to treat. There have been some reports of treatment of this condition with TKA combined with various realignment procedures. We treated a case of knee OA with PD using only TKA via a lateral parapatellar approach for devising exposure and closure methods.

Informed patient consent

The authors declare that informed patient consent was taken from all the patients for publication of their clinical information.

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