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# Rotating Hinge Knee Prosthesis for Severe Valgus Knee Deformity: A Case Report

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## Abstract

Cases of valgus knee deformity are relatively rare and special cases in the orthopedic clinics. Especially severe deformities according to Keblish classification are challenging cases for orthopedic surgeons. These patients require a serious preoperative planning prior to surgery. Herein, we shared a our case with a 67-year-old woman with 45° valgus knee deformity with congenital hip dislocation on the right lower limb, which was classified as a severe deformity according to Keblish classification. Knee examination revealed 60° flexion and almost complete extension of right knee. As a result of our planning, we decided to use a Rotating Hinge Knee (RHK) prosthesis to maintain bone and soft tissue balance. The NexGen RHK prosthesis was preferred to correct deformity. Fracture of the medial femoral condyle occurred and fixed as intraoperative complication. The Knee Society Score (KSS) increased from 40 to 91. Patient stated that knee pain completely resolved and could be mobilized easily. RHK prosthesis is an important option for correction deformity in patients with severe valgus knee deformity. Long-term follow-up of these patients is needed to determine the success rate.

**Keywords: Osteoarthritis; Keblish classification; Valgus knee deformity; Knee society score; Rotating hinge knee prosthesis**

## Introduction

Total Knee Arthroplasty (TKA) is a commonly used procedure to treat osteoarthritis and correct knee deformity and valgus deformity is present in approximately 10% of patients in need of TKA [1,2]. Keblish classification shows the grading of valgus deformity by measuring Femorotibial Angle (FTA) on X-ray. According to Keblish classification mild deformity angle is <15°, moderate deformity angle is between 15° to 30° and severe deformity angle is >30° [3]. In TKA, bone defects and soft tissue tensions are very important in deciding the type of prosthesis. Usually primary implants are sufficient after appropriate releasing of soft tissues in the lateral portion of knee, especially mild and some moderate deformities. The use of varus-valgus constrained prostheses in moderate and some severe deformities give good results [4]. But most of the severe deformities have bone defect or ligament instability, so these patients need Rotating Hinged Knee (RHK) prostheses [5,6]. RHK prostheses are particularly successful in adjusting severe coronal plan deformities and soft tissue balance [7]. But RHK prostheses may cause some complications. Especially sagittal alignment failures may cause early loosening of the prosthesis [8]. Nonetheless, when we look at the literature, the publication rate of loosening of RHK prostheses is low [9].

Many diseases can cause the development of valgus deformity in the knee. These include congenital causes, osteoarthritis, rheumatologic diseases, posttraumatic arthritis and overcorrection of valgus osteotomies [4]. Especially valgus deformities >20° are difficult cases for orthopedic surgeons [10].

Here we report a 67 year-old woman 45° × knee valgus deformity patient with ipsilateral congenital hip dislocation. These patients are rare and require serious planning for treatment [11]. We successfully treated this patient with RHK prosthesis.

## Case Presentation

A 67-year-old woman was admitted to our hospital with complaints of gait disorder and right knee pain. Physical examination revealed a 5 cm shortening in the right leg, valgus deformity on the right knee and external tibial torsion on the same leg (Figure 1). Knee examination revealed

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**Figures 1:** Valgus knee deformity and external tibial torsion.

**Figure 2:** Preoperative orthorontgenogram of the patient.

**Figure 3:** Pelvic obliquity of patient's pelvic anteroposterior X-ray.

60° flexion and almost complete extension of right knee. Medial Collateral Ligament (MCL) was slack and Lateral Collateral Ligament (LCL) was contracture. The patella was in the trochlear groove, but it was very fixed. Hip examination of the same limb showed 45° of flexion, but internal and external rotation was very limited. Through the above examination, Knee Society Score (KSS) of patient was assessed to be 40 [11].

X-ray examination of patient revealed ankylosis in the left hip, Crowe type 4 congenital hip dislocation in the right hip, severe valgus deformity (45° FTA) in the right knee and external tibial torsion in the right calf (Figure 2, 3). According to the Keblish classification, this patient was classified as a severe deformity [3]. Although the tibial plateau was intact, there was severe bone loss, especially in the lateral femoral condyle (Figure 4, 5).

**Figure 4:** Preoperative AP knee X-ray of the patient.

**Figure 5:** Preoperative lateral knee X-ray of the patient.

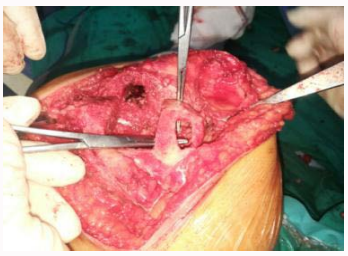

**Figure 6:** Cyst in the lateral femoral condyle.

We performed detailed measurements and evaluation before the operation. Because of the presence of congenital hip dislocation in the same extremity, we recommended the shortened total hip replacement surgery to compensate for patellar alignment. However, our patient refused the hip operation, saying that she did not have any complaints from her hip so we decided to do only knee replacement surgery. We thought that it would be appropriate to use rotating hinge knee prosthesis because the MCL was very loose and there was severe bone loss in the lateral femoral condyle.

We applied our tourniquet and tranexamic acid protocol for bleeding control. We preferred to reach the knee joint with a medial parapatellar approach. Lateral femoral condyle was relatively small compared to medial femoral condyle. Especially the MCL was not competent. We have seen osteophyte formation in many different regions of the knee. Anterior and posterior cruciate ligaments were degenerated in the femoral notch. Medial and lateral menisci were worn and calcified. There was severe cartilage loss and arthritis of the femoral, tibial and patella joint surfaces and again severe tibial extorsion.

**Figure 7:** Postoperative orthorontgenogram of the patient.

**Figure 8:** Postoperative right knee extension and alignment of the patient.

**Figure 9:** Postoperative knee flexion of the patient.

After resection of the hyperplastic osteophyte and sinovium, the popliteus tendon was first released. Then LCL was completely incised from the femoral adhesion site. Subsequently, iliotibial band was released and flexion and extension gaps were balanced.

Based on the preoperative X-ray, we selected the femoral canal in the medial femoral condyle as the entry point for the intramedullary guide. A large cystic formation was seen in the lateral femoral condyle after making femoral resections (Figure 6). After curetting this cyst, we filled the interior with spongious bone from the resections. After the internal and external rotation, tautness of the knee joint and alignment were tested, The NexGen RHK (Zimmer, USA) prosthesis (tibia size 2/80 mm, femur size C/100 mm, patella 29 mm and polythene 12 mm) was installed. The patella was dislocated and did not enter the trochlear groove. Thus, firstly the lateral patellar retinaculum was released. After that the 8 mm patellar resection was made and patellar component was placed in the superomedial portion of the patella and the patella was reduced. Knee joint alignment was

**Figure 10:** Postoperative AP knee X-ray of the patient.

**Figure 11:** Postoperative lateral knee X-ray of the patient.

correct after surgery (Figure 7). The movement of the knee joint ranged from 0° to 90° (Figure 8, 9).

Our only intraoperative complication was fracture of the medial femoral condyle during the test. We fixed the broken condyle with two 4.5 mm cannulated screws. Then we placed cemented prosthesis on the fixed condyle. The X-ray image showed prosthesis position (Figure 10, 11). We had no postoperative complications. We started rehabilitation on the first postoperative day and mobilized without weight bearing for 3 weeks. The patient was regularly followed up 1 year after surgery. There was no loss of range of motion within the following year. The KSS had improved to 82 at the 1-month follow up, 88 at the 1-year follow up and 91 at the 2-year follow up. Patient and her relatives were given permission to publish this case report.

## Discussion

Herein, we shared a our case with a 67-year-old woman with severe valgus knee deformity angle (45°), which was classified as a severe deformity according to Keblish classification. During surgery we released the popliteus tendon, LCL and iliotibial band respectively to maintain joint balance. RHK implants was preferred because of severe bone deformity and ligament laxity. These implants are very useful for TKA in patients with moderate and severe genu valgum [12]. In the literature, different results regarding the use of rotating hinge implants in primary TKA have been reported [13]. Although some authors claim that rotating hinge implants have very good clinical outcomes and long-term survival, higher rates of complications have been reported compared to another authors [14,15]. However, we preferred this prosthesis in our surgery because RHK prosthesis was the most appropriate option for our case.

A wide range of approaches to the knee joint, such as medial

parapatellar, lateral parapatellar, subvastus and midvastus can be used. Medial and lateral parapatellar are more suitable for valgus knee deformities. We preferred the medial parapatellar approach in our case because we did not have enough experience, although the lateral parapatellar approach provided ease in releasing the lateral structures.

Patella subluxation or dislocation in the valgus knee is a common condition. Patellar dislocation due to congenital disorders can be classified into 3 groups. These are soft tissue and joint laxity, patellar hypoplasia and skeletal dysplasia of the femur and tibia, soft tissue fibrosis and contracture [16]. Usually patellar alignment can be corrected with knee arthroplasty in mild to moderate knee valgus deformities. However, lateral patellar retinaculum, popliteus tendon and lateral portion of gastrocnemius releasing, even anteromedial tibial tubercle transfer, may be necessary to correct patellar alignment in severe deformities. In our case, we primarily released the lateral patellar retinaculum and the popliteus tendon to correct the patellar trajectory. However, the patellar trajectory did not improve. Then we medialized the patella using the patellar component and thus obtained a correct patellar alignment. Tibial tubercle osteotomy was our preferred method and it was not necessary.

The risk of peroneal nerve injury is higher in the knees with valgus deformity and its incidence is about 2% to 3% [17]. One of the major causes of peroneal nerve injury is correction of knee flexion contracture. We did not think that peronel nerve dissection during surgery will be beneficial. Therefore, we do not prefer to perform peroneal nerve dissection due to the risk of iatrogenic injury. To prevent peroneal nerve palsy, the knees are placed in the 20° flexion position for 3 to 4 days postoperatively and active-passive range of motion exercises are performed [18]. In our case, no neurological deficits were found in the preoperative and postoperative examinations.

## Conclusion

In summary, in a case with congenital hip dislocation and 45° knee valgus deformity of same extremity, RHK prosthesis was successfully applied and the patient's knee pain was relieved and it was easier to walk. Appropriate methods were preferred and patellar alignment was achieved. There was no peroneal nerve palsy after surgery, although it was a serious risk. Since there are limited studies in the literature about long-term results of rotating hinge knee prostheses, therefore, close follow-up is necessary to obtain information about long-term outcomes.

## References


1. Elkus M, Ranawat CS, Rasquinha VJ, Babhulkar S, Rossi R, Ranawat AS. Total knee arthroplasty for severe valgus deformity. Five to fourteen-year follow-up. J Bone Joint Surg Am. 2004;86(12):2671-6.
2. Ranawat AS, Ranawat CS, Elkus M, Rasquinha VJ, Rossi R, Babhulkar S. Total knee arthroplasty for severe valgus deformity. J Bone Joint Surg Am. 2005;87(Suppl 1)(Pt 2):271-84.
3. Keblish PA. The lateral approach to the valgus knee. Surgical technique and analysis of 53 cases with over two-year follow-up evaluation. Clin Orthop Relat Res. 1991;271:52-62.
4. Rossi R, Rosso F, Cottino U, Dettoni F, Bonasia DE, Bruzzone M. Total knee arthroplasty in the valgus knee. Int Orthop. 2014;38(2):273-83.
5. Nelson CL, Gioe TJ, Cheng EY, Thompson RC Jr. Implant selection in revision total knee arthroplasty. J Bone Joint Surg Am. 2003;85-A Suppl 1:S43-51.
6. Kurtz SM, Lau E, Ong K, Zhao K, Kelly M, Bozic KJ, et al. Future young patient demand for primary and revision joint replacement: National projections from 2010 to 2030. Clin Orthop Relat Res. 2009;467(10):2606-12.
7. Malcolm TL, Bederman SS, Schwarzkopf R. Outcomes of varus valgus constrained versus rotating-hinge implants in total knee arthroplasty. Orthopedics. 2016,39(1):e140-8.
8. Guo J, Cao G, Zhang Y, Song W, Qin S, Ma T, et al. Total knee arthroplasty for a valgus deformity angle of >90°: A case report. Medicine. 2019;98(23):e15745.
9. Sanguineti F, Mangano T, Formica M, Franchin F. Total knee arthroplasty with rotating-hinge Endo-Model prosthesis: Clinical results in complex primary and revision surgery. Arch Orthop Trauma Surg. 2014;134:1601-7.
10. Nikolopoulos D, Michos I, Safos G, Safos P. Current surgical strategies for total arthroplasty in valgus knee. World J Orthop. 2015;6(6):469-82.
11. Insall JN, Dorr LD, Scott RD, Scott WN. Rationale of the Knee Society clinical rating system. Clin Orthop Relat Res. 1989;248:13-4.
12. Rawal J, Devany AJ, Jeffery JA. Arthroplasty in the valgus knee: Comparison and discussion of lateral *vs.* medial parapatellar approaches and implant selection. Open Orthop J. 2015;9:94-7.
13. Lakstein D, Zarrabian M, Kosashvili Y, Safir O, Gross AE, Backstein D, et al. Revision total knee arthroplasty for component malrotation is highly beneficial: A case control study. J Arthroplasty. 2010;25(7):1047-52.
14. Petrou G, Petrou H, Tilkeridis C, Stavrakis T, Kapetsis T, Kremmidas M, et al. Medium-term results with a primary cemented rotating-hinge total knee replacement: A 7- to 15-year follow-up. J Bone Joint Surg Br. 2004;86(6):813-7.
15. Guenoun B, Latargez L, Freslon M, Defossez G, Salas N, Gayet L-G. Complications following rotating hinge Endo-Modell (Link) knee arthroplasty. Orthop Traumatol Surg Res. 2009;95(7):529-36.
16. Kitta Y, Niki Y, Udagawa K, Enomoto H, Toyama Y, Suda Y. Severe valgus deformity of the knee with permanent patellar dislocation associated with melorheostosis: A case report and review of the literature. The Knee. 2014;21(2):589-93.
17. Nercessian OA, Ugwonali OF, Park S. Peroneal nerve palsy after total knee arthroplasty. J Arthroplasty. 2005;20(8):1068-73.
18. Speelziek SJA, Staff NP, Johnson RL, Sierra RJ, Laughlin RS. Clinical spectrum of neuropathy after primary total knee arthroplasty: A series of 54 cases. Muscle Nerve. 2019;59(6):679-82.