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Medial Approach Total Knee Arthroplasty in Severe Valgus Deformity due to Knee Osteoarthritis - A Case Report

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Abstract

A 69-year-old man presented with severe valgus deformity and pain related to progressive bilateral knee osteoarthritis. At admission, the patient could walk a maximum distance of 200 meters without any orthopaedic aids. The patient was scheduled for total knee arthroplasty (TKA) of his left knee. The left knee demonstrated a 5° extension deficit and maximum flexion of 90°. He underwent a medial approach TKA of the left knee using a rotating hinge prosthesis - Legion Hinge. After the operation, full extension and flexion of 129° were achieved, with stability throughout the entire range of motion (ROM). At discharge, he was walking with elbow crutches and was appointed for physiotherapy at a rehabilitation clinic. At the two-month follow-up control check-up, the patient presented with improved flexion to 135 degrees, better pain control and improved quality of life compared to the period preceding the operation.

Key words: valgus deformity, knee osteoarthritis, total knee arthroplasty, case report, orthopaedics.

1. Introduction

Genu valgum, also known as knock knees, is a condition characterised by the inward angulation of the knees. It is usually a part of normal lower limb development in childhood and usually self-corrects by age 7, requiring no intervention. Less commonly, this type of deformation can be observed during adolescence or adulthood due to disease. Conditions such as skeletal dysplasias, arthritis, metabolic bone diseases, tumours and infections can cause secondary genu valgum.

It is critical to assess whether genu valgum is bilateral or unilateral, whether it is physiological or secondary to another condition and how it affects the patient. Patients may experience altered gait, stiffness or persistent pain.

Treatment varies depending on the cause of genu valgum. The first step may be physical therapy, but if the pain is persistent and genu valgum is severe, surgical options are being considered. That includes osteotomy or, as in this case, total knee arthroplasty.

Valgus knee may be observed in around 10% of patients undergoing TKA[1]. In the article Mazotti et al. [2], associate valgus alignment with a twofold risk of failure compared with varus alignment, when both are treated with TKA. It is considered a technically challenging procedure, as it may be difficult to achieve a sufficient soft-tissue balance [3].

In the valgus deformity, lateral structures are contracted or elongated[4]. That means that structures such as the lateral collateral ligament (LCL), posterolateral capsule (PLC), iliotibial band (ITB), hamstring tendons or the lateral head of the gastrocnemius are deeply affected by the genu valgum.

Two approaches are used for TKA in valgus knee deformities: medial and lateral parapatellar[5]. The optimal method remains controversial, with studies reporting varying outcomes[3, 5-8]. Sharing clinical cases is essential to help establish consensus.

This report presents a case of total knee arthroplasty for valgus deformity secondary to knee osteoarthritis. Correction of the deformity was achieved using the Legion hinge system, as confirmed by postoperative evaluations.

2. Case Report

Pre-operative period.

A 69-year-old man with bilateral knee osteoarthritis and valgus deformity was referred from an orthopaedic clinic to a regional hospital for a primary two-compartment knee replacement using the Legion hinge system. The patient had a fifteen-year history of bilateral osteoarthritis of the knees. During this period, his symptoms progressively worsened, with pain reaching 8/10 on the Numeric Rating Scale (NRS), accompanied by increasing valgus deformation. He complained of walking

difficulties, with a maximum walking distance without rest of 200 meters, as well as pain when climbing stairs. He had worked physically for many years as a farmer, but over time, the disease's symptoms increasingly limited his work capacity. His medical history also included hypertension, asthma, prostate hypertrophy and GERD. At the age of 25, he sustained a fracture of the left lower leg complicated by the development of pseudoarthrosis and a bacterial bone infection.

Upon admission, the patient presented with a valgus (Figure 1), right-dominant limping gait and did not use any orthopaedic aids. Physical examination of the left lower limb revealed widening of the knee joint contour, valgus alignment, a cyst in the popliteal fossa, limb shortening of 3 cm, multiple scars on the lower leg and muscle atrophy. The left knee demonstrated a 5° extension deficit with a maximum flexion of 90°. No flexion contracture was observed. Additionally, medial collateral ligament (MCL) instability and lateral patellar maltracking were present. There was no functional deficit of the peroneal nerve, and the dorsalis pedis pulse was preserved.

Prior to admission, he attended an outpatient clinic where he received conservative treatment, which included physical therapy, intra-articular corticosteroids, intra-articular hyaluronic acid, NSAIDs, tramadol, and chondroitin supplements. These interventions provided only transient pain relief and did not lead to long-term satisfactory outcomes.

Preoperative radiographs of the lower limbs confirmed genu valgum with axis deviation of approximately 35° in the left limb and 25° in the right limb (Figure 2). Both knee joints exhibited bone defects and osteophyte formation (Figure 3).

Figure 1. Clinical presentation of valgus deformity with abnormal gait pattern

Figure 2. Preoperative radiograph of the lower limbs demonstrating severe bilateral valgus alignment in the knee joints

Figure 3. Preoperative radiograph showing severe osteoarthritis in the left knee joint

Perioperative period and procedure

Based on the clinical examination and imaging studies described above, the surgical procedure was planned. The aim of the procedure was to reduce pain while maintaining the flexion function of the knee joint. Due to the high instability of the ligament apparatus, implantation of a rotating hinge prosthesis – Legion Hinge – was initially planned. Hinged prostheses provide knee stability through intramedullary stem fixation, without dependence on the ligamentous apparatus; therefore, selective collateral ligament balancing was not planned. Long stems, additionally stabilised by cementation, were selected to improve the primary stability of the implant. A wide, careful resection of pathologically changed soft tissues was planned. Due to the history of osteomyelitis, intraoperative collection of material for microbiological examination was planned.

The patient was placed supine with the left lower limb flexed at the hip and knee joints to 90°, with the possibility of increasing flexion and extending the leg intraoperatively to assess correct implant positioning. A standard midline approach was used. After exposing the joint, extremely degenerated articular surfaces were revealed (Figure 4), along with a pathological gap running along the condyle. The medullary cavity of the femur was opened, resecting approximately 10 mm of bone, and prepared in accordance with the requirements of the implant. Due to the extreme insufficiency of the ligament apparatus and the independence of hinged prosthesis stability from the ligamentous structures, the classic selective balancing of the collateral ligaments was abandoned.

The Legion Hinge rotating hinge prosthesis was used. On the femoral side, a size 7 component with a 2 mm offset at position 6 and a 160/22 mm stem was used, while on the tibial side, a size 7 component with a 10 mm lateral augment and a 160/14 mm stem was implanted. Due to the significant loss of the lateral condyle, it was decided to prepare the condyle to accommodate the 10 mm augment. Following implantation (Figure 5), patellar tracking was assessed and found to be satisfactory, without the need for additional procedures.

Intraoperatively, the joint stability and axis were repeatedly checked, both on trial components and after final implantation. No soft tissue conflict was observed. Full extension and flexion of 129° (Figure 6) were achieved, with stability throughout the entire range of motion (ROM). A Redon drain was placed, the wound was closed in layers, and the wound was covered with a sterile dressing.

Postoperatively, the patient demonstrated intact dorsiflexion and plantar flexion of the foot and toes. No peroneal nerve or distal vascular deficits were observed. The surgical wound healed appropriately, with no local complications.

During the initial postoperative period, the patient remained in stable condition, without fever or cardiorespiratory complications. Pain was well managed, and distal neurovascular status was preserved. On postoperative day two, two units of packed red blood cells were transfused due to decreased haemoglobin, without adverse events. The wound healed properly, with two blood blisters noted under the dressing that did not affect healing. Physiotherapy during hospitalisation resulted in approximately 60° of knee flexion. At discharge, the patient was walking with elbow crutches and was instructed in a non-standard order for ascending and descending stairs. This recommendation resulted from persistent significant instability and advanced degenerative changes in the contralateral, unoperated knee joint.

Figure 4. Intraoperative view of the left knee joint showing severely degenerated articular cartilage

Figure 5. Intraoperative view after implantation of the rotating hinge prosthesis in the left knee joint

Figure 6. Intraoperative assessment of ROM of the left knee joint, demonstrating full flexion of 129° after implantation of the prosthesis

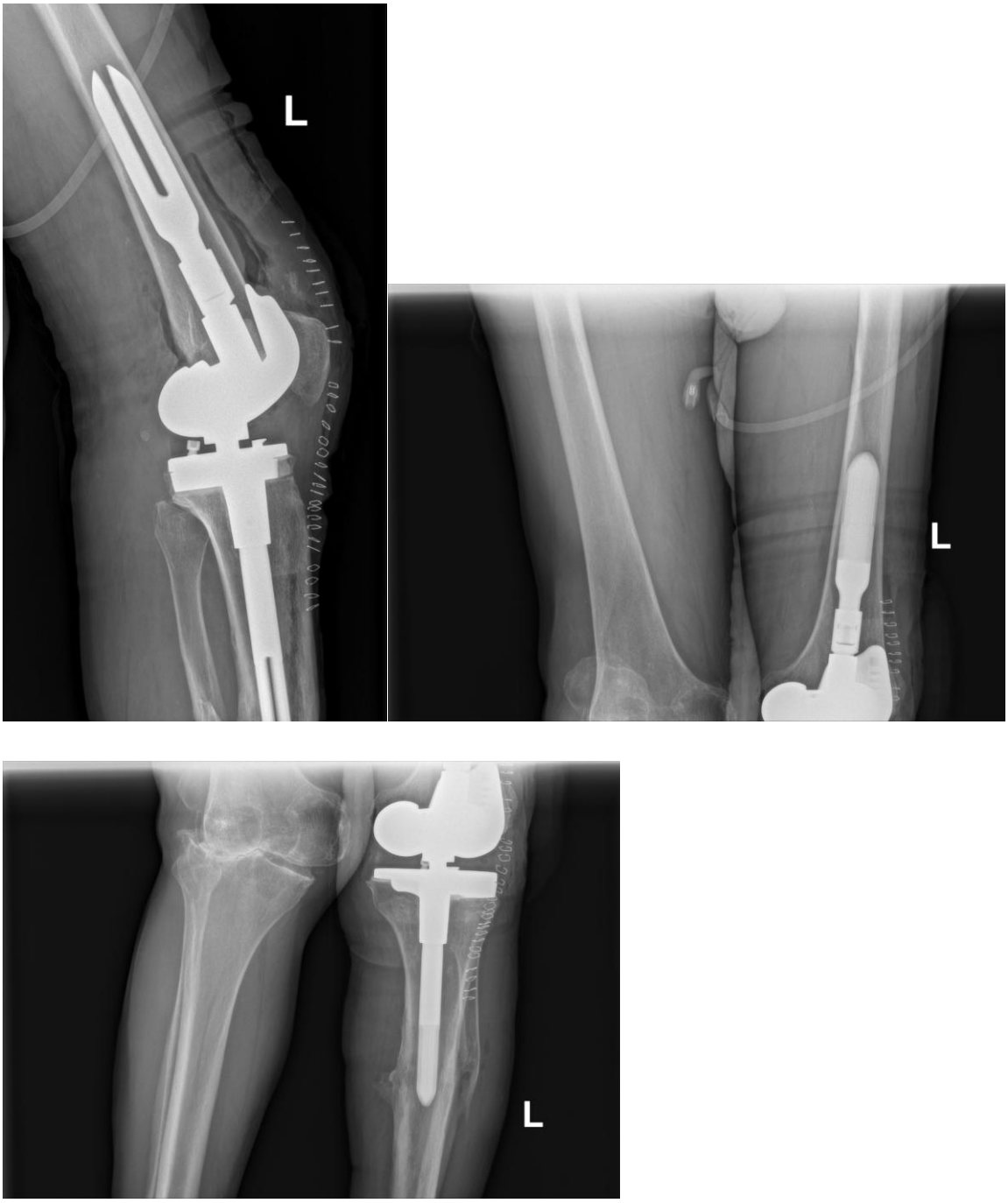

Figure 7. Postoperative radiograph showing the positioning and alignment of the rotating hinge prosthesis in the left knee joint

Post-operative period

Approximately 10 days post-discharge, the patient attended a follow-up visit for suture removal. The postoperative wound had healed without complications, and pain was effectively managed with the prescribed medication. To increase the range of motion in the operated knee joint and to accelerate recovery, the patient was provided with a continuous passive motion (CPM) device. Subsequently, he was admitted to a rehabilitation centre for a three-week program.

Rehabilitation included therapeutic exercises, electromagnetic field therapy, transcutaneous electrical nerve stimulation (TENS), cryotherapy, muscle electrostimulation, iontophoresis, warm and dry compresses and massage therapy. Inpatient rehabilitation resulted in improved joint mobility and reduced pain.

The patient then attended another follow-up visit at the orthopaedic outpatient clinic. The knee's range of motion improved to 135°. No extension deficit or flexion contracture was observed, and the joint was stable on examination. The patient reported further improvement in pain and mobility and was able to bear full weight on the operated limb.

The patient continued to use crutches for ambulation outside the home for increased security, but did not require them at home. At follow-up, pain in the operated limb was mild, while the non-operated limb was more symptomatic. Stair ascent was performed by leading with the operated limb, and descent by leading with the non-operated limb. Gait assessment revealed a slight trunk lean toward the right (non-operated) side. The patient also reported lumbar spine pain, possibly secondary to postoperative postural asymmetry and compensatory weight shifting.

In light of the favourable surgical outcome, total knee arthroplasty of the right lower limb was scheduled approximately four months after the initial procedure.

3. Discussion

Total knee arthroplasty (TKA) in severe valgus deformity is a technically demanding procedure associated with a higher reported risk of failure compared to TKA in varus knees [1,2]. In the presented

case, the deformity exceeded 30°, placing it among the most difficult scenarios described in the literature and associated with a higher risk of postoperative instability and failure [2].

The two most commonly used approaches in TKA are the medial parapatellar and lateral parapatellar techniques. The medial parapatellar approach is the standard and is preferred by most surgeons, with satisfactory long-term outcomes reported [9, 10]. The lateral parapatellar approach is considered superior for preserving medial structures, optimising patellar tracking, and retaining the medial patellar blood supply. However, due to technical obstacles in achieving adequate exposure and soft tissue closure, it is a secondary option [9, 11]. According to the literature, it has not yet been determined which approach is more beneficial for patients, as various studies have reported conflicting results [3, 12, 13]. In a review by Rajnish et al.[13], better functional outcomes in terms of the Knee Society Score (KSS) were reported with the medial approach. However, both methods were comparable with regard to the Knee Society Function score, knee flexion range of motion, and overall complication rates. Furthermore, in a meta-analysis conducted by Mercurio et al.[12], the medial approach was associated with significantly better functional outcomes in terms of KSS and flexion ROM. However, these differences did not meet the minimal clinically important difference. A study by Sekiya et al.[3] found no significant differences in any of the measured values, except for the postoperative flexion angle, which was higher in the lateral approach group. Overall, the available evidence suggests that both approaches result in comparable clinical outcomes, although certain functional parameters may vary between studies. In this case, the standard medial parapatellar approach was selected.

In the management of valgus knee deformity, cruciate-retaining, posterior-stabilised, condylar constrained knee or hinged implants are used depending on the degree of joint instability, existence of bone defects and age of the patient [9, 14, 15, 16]. Unlike conventional TKA implants, which require precise soft-tissue balancing, hinged implants provide intrinsic stability through their mechanical design [17, 18]. This allows for the reduction or even the omission of extensive ligament-balancing procedures. In the present case, due to global ligament insufficiency, significant lateral condyle bone loss and patient age over 60 years, a rotating hinge prosthesis was selected as the primary stabilising element. This approach is recommended in severe deformity, collateral ligament incompetence, substantial bone loss and elderly patients [15, 16, 17, 19, 20].

Despite their advantages, hinged prostheses are associated with specific risks. Increased constraint results in higher mechanical stress at the bone–implant interface, possibly causing aseptic

loosening, polyethylene wear, and mechanical failure over time [15, 18, 19]. These implants are also associated with higher infection rates than less-constrained designs [19]. However, in cases of severe instability, the benefits of immediate and reliable joint stability may surpass these risks.

In our case, although it was a high degree deformity correction, no early complications were observed, including those related to the deformity itself, such as peroneal nerve palsy, nor those related to the procedure, such as postoperative instability [9]. The patient achieved a significant improvement in ROM, pain reduction, and functional mobility. These outcomes are comparable to those reported in the literature for complex valgus knees treated with constrained or hinged prostheses [1,4].

4. Conclusions

This case demonstrates that total knee arthroplasty using a rotating hinge prosthesis can be an optimal treatment option for patients with advanced valgus deformity. Careful preoperative planning, adequate surgical technique and postoperative rehabilitation are crucial in order to help this complex patient population.

Despite the severity of the deformity, the medial approach provided sufficient exposure and satisfactory patellar tracking without requiring additional realignment procedures. This leads to the conclusion that, even in severe valgus deformities, the medial approach is successful when paired with appropriate implant selection and thorough intraoperative assessment.

The short-term outcomes were promising; however, further studies involving larger cohorts and extended follow-up are necessary to better define the durability and optimal indications for rotating hinge systems in valgus knee arthroplasty.

Disclosure

The authors declare that they have no financial or non-financial conflicts of interest that could be perceived as influencing the interpretation of the research findings or the content of this manuscript. This work was conducted independently without any external funding or support.

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The patient provided written informed consent for the publication of the data concerning the case.

Data Availability Statement

As a case report paper, our work does not present new data or analyses. Therefore, there are no specific databases or data availability to report. The information and findings presented in this case report are based on previously published studies, which can be accessed through their resective sources as cited in the reference section.

Conflicts of Interest

The authors declare that there are no significant conflicts of interest associated with this research work.

References

[1] Ranawat AS, Ranawat CS, Elkus M, Rasquinha VJ, Rossi R, Babhulkar S. Total Knee Arthroplasty for Severe Valgus Deformity. *JBJS Essent Surg Tech*. 2005;os-87(1_suppl_2):271-284. doi:10.2106/jbjs.e.00308

[2] Mazzotti A, Perna F, Golinelli D i in. Preoperative valgus deformity has twice the risk of failure as compared to varus deformity after total knee arthroplasty. *Knee Surg Sports Traumatol Arthrosc*. 2018;27(9):3041-3047. doi:10.1007/s00167-018-5331-6

[3] Sekiya H, Takatoku K, Takada H, Sugimoto N, Hoshino Y. Lateral approach is advantageous in total knee arthroplasty for valgus deformed knee. *Eur J Orthop Surg Amp Traumatol*. 2012;24(1):111-115. doi:10.1007/s00590-012-1137-2

[4] Rossi R, Rosso F, Cottino U, Dettoni F, Bonasia DE, Bruzzone M. Total knee arthroplasty in the valgus knee. *Int Orthop*. 2013;38(2):273-283. doi:10.1007/s00264-013-2227-4

[5] Gunst S, Villa V, Magnussen R, Servien E, Lustig S, Neyret P. Equivalent results of medial and lateral parapatellar approach for total knee arthroplasty in mild valgus deformities. *Int Orthop*. 2015;40(5):945-951. doi:10.1007/s00264-015-2893-5

[6] Chapron E, Coulomb R, Weiss A, Marchand P, Kouyoumdjian P. Robot-assisted surgery and knee arthroplasty in genu valgum: impact of the surgical approach. *Orthop Traumatol Surg Res*. 2025;111(4):104226. doi:10.1016/j.otsr.2025.104226

[7] Li H, Ponzio DY, Ong A, et al. Erratum: Total Knee Arthroplasty for Fixed Valgus Deformity Correction Using a Modified Lateral Parapatellar Approach. *J Knee Surg*. 2020;33(4):e2. doi:10.1055/s-0039-3399509

[8] Wang X, Weng X, Lin J, Jin J, Qian W. *Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi*. 2012;26(5):513-517. PMID:22702039

[9] Alesi D, Meena A, Fratini S, et al. Total knee arthroplasty in valgus knee deformity: is it still a challenge in 2021?. *Musculoskelet Surg*. 2022;106(1):1-8. doi:10.1007/s12306-021-00695-x

[10] Rajgopal A, Dahiya V, Vasdev A, Kochhar H, Tyagi V. Long-Term Results of Total Knee Arthroplasty for Valgus Knees: Soft-Tissue Release Technique and Implant Selection. *J Orthop Surg*. 2011;19(1):60-63. doi:10.1177/230949901101900114

[11] Li H, Ponzio DY, Ong A, et al. Total Knee Arthroplasty for Fixed Valgus Deformity Correction Using a Modified Lateral Parapatellar Approach. *J Knee Surg*. 2020;33(4):372-377. doi:10.1055/s-0039-1677821

[12] Mercurio M, Gasparini G, Galasso O, et al. Lateral versus medial approach for total knee arthroplasty for valgus knee deformity shows comparable functional outcomes, hip-knee-ankle angle values, and complication rates: a meta-analysis of comparative studies. *Arch Orthop Trauma Surg*. 2024;144(2):869-878. doi:10.1007/s00402-023-05088-2

[13] Rajnish RK, Srivastava A, Yadav SK, et al. Comparative Analysis of Outcomes of Lateral Versus Medial Approach in the Total Knee Arthroplasty for Valgus Deformity: A Systematic Review and Meta-analysis. *Indian J Orthop*. 2024;58(10):1323-1338. Published 2024 Jul 1. doi:10.1007/s43465-024-01211-6

[14] Koskinen E, Remes V, Paavolainen P, et al. Results of total knee replacement with a cruciate-retaining model for severe valgus deformity--a study of 48 patients followed for an average of 9 years. *Knee*. 2011;18(3):145-150. doi:10.1016/j.knee.2010.04.001

[15] Gehrke T, Kendoff D, Haasper C. The role of hinges in primary total knee replacement. *Bone Joint J*. 2014;96-B(11 Supple A):93-95. doi:10.1302/0301-620X.96B11.34143

[16] Kendoff D, Haasper C, Gehrke T, Klauser W, Sandiford N. Management of Gonarthrosis with a Rotating Hinge Prosthesis: Minimum 10-Year Follow-up. *Clin Orthop Surg*. 2020;12(4):464-469. doi:10.4055/cios19153

[17] Sculco PK, Flevas DA, Jerabek SA, et al. Management of Bone Loss in Revision Total Knee Arthroplasty: An International Consensus Symposium. *HSS J*. 2024;20(2):141-181. doi:10.1177/15563316231202750

[18] Barrack RL. Evolution of the rotating hinge for complex total knee arthroplasty. *Clin Orthop Relat Res*. 2001;(392):292-299. doi:10.1097/00003086-200111000-00038

[19] Springer BD, Sim FH, Hanssen AD, Lewallen DG. The modular segmental kinematic rotating hinge for nonneoplastic limb salvage. *Clin Orthop Relat Res*. 2004;(421):181-187. doi:10.1097/01.blo.0000126306.87452.59

[20] Malcolm TL, Bederman SS, Schwarzkopf R. Outcomes of Varus Valgus Constrained Versus Rotating-Hinge Implants in Total Knee Arthroplasty. *Orthopedics*. 2016;39(1):e140-e148. doi:10.3928/01477447-20151228-07