Case Report

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Lessons from a Challenging Case: Bilateral Valgus Knee

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ABSTRACT

Osteoarthritis (OA) of both knees with fixed valgus deformity presents a surgical challenge during Total Knee Arthroplasty (TKA) because of lateral soft-tissue imbalance, bone loss, and patellofemoral involvement. A case of a 66-year-old man with severe bilateral knee OA with fixed bilateral valgus knee deformity treated with staged bilateral TKA is described, with objective assessment using clinical valgus angle, Range of Motion (ROM), and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score. At 3-month follow-up, objective improvement was demonstrated with correction of the clinical valgus alignment to near neutral alignment, increased ROM from 10°-90° right and 5°-95° left preoperatively to 0°-115° right and left, and decreased total WOMAC score from 73 immediately postoperatively to 18 at three months. The importance of careful preoperative assessment, sequential lateral soft-tissue release, appropriate posterior-stabilised implant selection and structured rehabilitation in fixed valgus knees is highlighted.

Keywords: Bilateral valgus knee, Osteoarthritis, Soft-tissue balancing, Total knee arthroplasty, WOMAC score

CASE REPORT

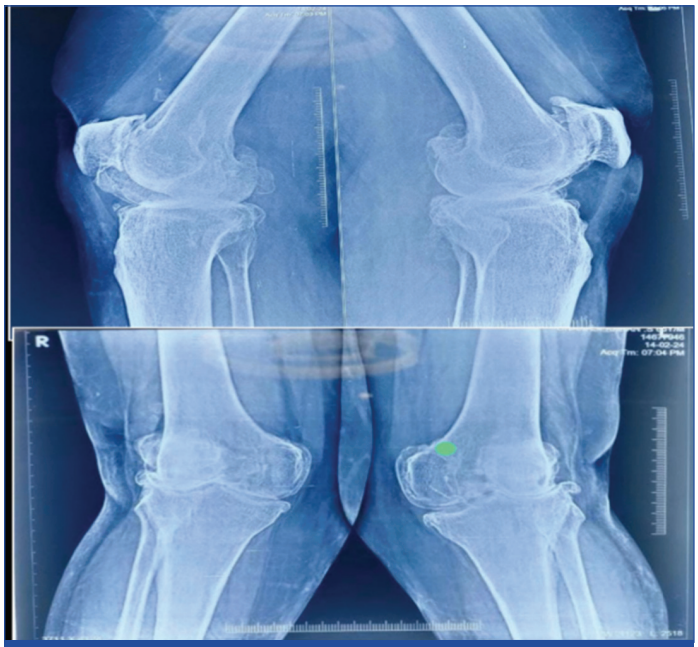
A 66-year-old man presented with progressive pain in both knees predominantly affecting the lateral aspects, along with noticeable bilateral valgus deformity and increasing difficulty in walking for 10 years. The pain was mechanical in nature, aggravated by activity and partially relieved by rest and analgesics. He had difficulty climbing stairs, squatting, and walking long distances. Severe bilateral OA of the knee with fixed bilateral valgus deformity was the working diagnosis. There were no records showing diabetes mellitus, hypertension, renal disease, anticoagulant use or any other major systemic disease. The patient had used analgesics/NSAIDs intermittently and had received conservative management in the form of activity modification, physiotherapy, oral analgesics and walking support prior to surgery without adequate symptom control. The treatment goals were to reduce pain, improve walking ability, and enhance functional performance in daily activities, assessed using ROM, clinical alignment and WOMAC score.

Clinical Examination

The gait was antalgic and both knees were in valgus. Clinically, the fixed flexion and valgus deformities were around 10° fixed flexion and 15° right knee valgus, and 10° fixed flexion and 12° left knee valgus. There was crepitus and tenderness on the lateral joint line with a limited ROM in both knees. Clinical assessment showed satisfactory patellar tracking, and no gross patellar dislocation was observed. The fixed flexion component was partly due to hamstring tightness. There were no gross multidirectional instabilities, but mild medial laxity was seen on varus-valgus stress tests with tight lateral structures. Lachman and pivot-shift tests were not indicative of cruciate ligament instability. Distal pulses were present, capillary refill was normal bilaterally, and motor and sensory examination in the peroneal and tibial nerve distribution was intact. Written informed consent was obtained from the patient for publication of this case report and the accompanying clinical and radiographic images. The patient was informed that all reasonable efforts would be made to protect anonymity and confientiality.

Preoperative ROM was 10°–90° in the right knee and 5°–95° in the left knee, indicating an extension deficit and restricted flexion. The right knee had an extension loss of about 10° and flexion up to 90°, while the left knee had an extension loss of about 5° and flexion up to 95°.

Anteroposterior, lateral, and weight-bearing radiographs of both knees showed extensive lateral compartment joint-space narrowing, marginal osteophytes, subchondral sclerosis and valgus tibiofemoral alignment, along with tibial plateau remodeling and patellofemoral joint involvement. The findings were consistent with Kellgren-Lawrence grade IV OA. Long-leg alignment assessment was used for correction planning; clinically measured valgus deformities were approximately 15° on the right and 12° on the left. These features supported the diagnosis of bilateral valgus knee with advanced OA [Table/Fig-1].



[Table/Fig-1]: Standing anteroposterior radiograph of both knees showing bilateral valgus alignment with advanced lateral compartment Osteoarthritis (OA) and Kellgren-Lawrence grade IV changes.

Management

The patient failed conservative therapy and was scheduled for staged bilateral TKA. Planning involved evaluation of deformity

severity, ligament status, anticipated lateral release, implant constraint and alignment correction strategy. The deformity was fixed but correctable after planned lateral release, and there was no gross incompetence of the collateral ligaments to warrant a varus-valgus constrained implant; therefore, a posterior-stabilised cemented implant was chosen. No navigation or robotic assistance was used; traditional intramedullary femoral and extramedullary tibial guides were used. Staged bilateral surgery was considered more advantageous to minimise possible complications in the immediate postoperative period and to allow gradual rehabilitation between the two operations.

Surgical Technique: Both surgeries were performed under spinal anaesthesia through a standard midline incision and medial parapatellar approach. Intraoperatively, tight lateral soft-tissues and lateral compartment degeneration were observed. Sequential lateral release was performed in a stepwise fashion, beginning with controlled release of tight lateral capsular structures and the iliotibial band, followed by selective posterolateral release as required to achieve balanced flexion and extension gaps. Complete release was avoided to minimise instability and peroneal nerve traction. Intramedullary femoral and extramedullary tibial alignment guides were used to prepare femoral and tibial cuts. Patellofemoral joint involvement was the reason for patellar resurfacing. Following trial reduction, stability was evaluated with varus-valgus stress in extension and flexion, patellar tracking assessment and intraoperative limb-alignment assessment. Cemented posterior-stabilised components were placed, and final stability and alignment were verified during surgery [Table/Fig-2]. The implant details, including component sizes, constraint level and polyethylene insert thickness, are summarised in [Table/Fig-3].



[Table/Fig-2]: Postoperative anteroposterior and lateral radiographs showing cemented standard posterior-stabilised total knee replacement implants in situ with corrected limb alignment.

Implant component	Left knee	Right knee
Modular tibial tray	Size 4	Size 4
Femoral posterior-stabilised component	Size 3, standard posterior-stabilised (PS), unconstrained	Size 3, standard posterior-stabilised (PS), unconstrained
Tibial polyethylene insert	Size 4; 8-mm fixed-bearing polyethylene insert	Size 4; 8-mm fixed-bearing polyethylene insert

[Table/Fig-3]: Intraoperative implant details (DePuy PFC Sigma posterior-stabilised system). Legend: PS: posterior-stabilised; both knees received standard PS components without varus-valgus constrained components.

Postoperative Outcome

On the first day after surgery, early mobilisation and physiotherapy were started. Weight bearing as tolerated was allowed with walker support. The staged bilateral procedures were performed with an interval for recovery and risk stratification between the two sides. The patient had significant improvement in pain and functional ability at 3-month follow-up. Clinical examination revealed correction to near-neutral alignment of the knees, improved ROM to 0°-115° bilaterally, complete correction of extension deficit and independent ambulation for daily activities without support. At follow-up, there was progressive objective functional improvement in WOMAC scores, with pain improving from 15 to 3, stiffness from 6 to 1, physical function from 52 to 14, and total WOMAC score from 73 immediately following surgery to 18 at three months [Table/Fig-4]. There was no clinical evidence of superficial or deep infection, no laboratory or clinical indication of infective complication, no evidence of varus-valgus instability on stress examination and no peroneal nerve symptoms; motor and sensory examination remained normal [Table/Fig-5].

Follow-up interval	Pain (0-20)	Stiffness (0-8)	Physical function (0-68)	Total WOMAC score
Preoperative	17	7	58	82
Immediate postoperative	15	6	52	73
2 weeks	11	5	42	58
6 weeks	7	3	28	38
3 months	3	1	14	18

[Table/Fig-4]: WOMAC score at different postoperative intervals. Legend: WOMAC: Western Ontario and McMaster Universities Osteoarthritis (OA) Index; lower scores indicate better pain, stiffness and physical function.



[Table/Fig-5]: Preoperative and postoperative clinical standing images demonstrating visible correction of bilateral valgus alignment and improved standing posture. Objective assessment is supported by correction from approximately 15° right and 12° left valgus to near-neutral clinical alignment, ROM improvement to 0°-115° bilaterally, and WOMAC improvement from 73 to 18.

DISCUSSION

Total knee arthroplasty for valgus deformity requires careful consideration of the underlying pathoanatomy. Lateral compartment cartilage loss, hypoplasia of the lateral femoral condyle, tibial plateau remodeling, contracted lateral soft-tissues and variable attenuation of the medial collateral ligament are features of valgus knees [1,2]. Ligament balancing is more difficult in valgus deformities than in varus deformities. The deformity was clinically corrected and

correctable with sequential release; therefore, a standard cemented posterior-stabilised implant was considered adequate and additional varus-valgus constraint was not needed in the current case. Gap balancing performed intraoperatively helped determine the amount of release required, and weight-bearing long-leg assessment supported correction planning [3,4]. The key to successful valgus TKA is soft-tissue balancing. Published reports have emphasised the sequential release of contracted lateral structures in a stepwise manner, including the iliotibial band, lateral capsule and posterolateral structures, while avoiding over-release that could lead to instability or peroneal nerve stretch injury. In this patient, controlled sequential release resulted in balanced flexion and extension gaps, a stable joint line and acceptable patellar tracking. This supported the use of a posterior-stabilised implant rather than a constrained implant [5,6].

The present case was compared with previously published cases and followed established principles for valgus TKA: careful preoperative evaluation, lateral release, restoration of limb alignment and structured rehabilitation [Table/Fig-6] This patient had correctable valgus deformity after release and no gross collateral insufficiency, unlike cases where severe ligament incompetence required constrained implants. The postoperative flexion range of 115° is within the commonly accepted target range of 110°-120° after TKA, and the restoration of 0° extension indicates correction of the extension deficit. The WOMAC score improvement and independent ambulatory status were consistent with favourable outcomes reported in the valgus TKA literature [7,8].

Parameter	Previously published valgus TKA reports	Present case	Interpretation
Symptoms	Pain, deformity, lateral compartment disease and walking limitation are commonly described [1,2,4]	Ten-year bilateral lateral knee pain, visible fixed valgus deformity and difficulty in walking, stairs and squatting.	Clinical presentation was comparable to reported valgus OA cases.
Treatment	Stepwise lateral release and appropriate implant constraint are emphasised [5,6,8,10]	Staged bilateral TKA using medial parapatellar approach, controlled lateral release and cemented posterior-stabilised implants.	Constraint was not required because balanced gaps and stability were achieved.
Recovery	Functional improvement and ROM around 110°-120° are commonly considered acceptable after TKA [4,6,8]	ROM improved to 0°-115° bilaterally; WOMAC improved to 18 by three months; independent ambulation at six weeks.	Recovery was consistent with favourable functional outcomes reported in literature.

[Table/Fig-6]: The present case is compared with previously published cases and followed the principles for valgus Total Knee Arthroplasty (TKA).

The staged bilateral approach was helpful for monitoring wound healing, neurological status, pain control and rehabilitation progress prior to operating on the other side [9,10]. The most important issues in this case were bilateral functional limitation, fixed valgus deformity, tight lateral structures, patellofemoral involvement and prevention of postoperative instability. These were addressed through staged planning, medial parapatellar exposure, controlled lateral release, posterior-stabilised cemented components and structured physiotherapy.

CONCLUSION(S)

Bilateral TKA is an effective treatment option for advanced OA of the knee with fixed bilateral valgus deformity when appropriate patient selection, deformity assessment and soft-tissue balancing are performed. In this case, staged bilateral TKA with sequential lateral release and cemented posterior-stabilised implants resulted in objective improvement in ROM, WOMAC score, limb alignment and ambulation without infection, instability or peroneal nerve deficit during follow-up.

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