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Bilateral knee osteoarthritis with bilateral intra-articular fractures (ipsilateral femoral condyle and contralateral tibial condyle) treated by combined total knee replacement and fracture reconstruction/fixation in a 73-year-old male patient: first case report.

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ABSTRACT

Background:

Bilateral knee osteoarthritis combined with concurrent bilateral intra-articular fractures involving asymmetric fracture patterns on each side, specifically, a femoral condyle fracture on one limb and a tibial condyle fracture on the contralateral limb, is an exceptionally rare clinical scenario. No prior publication has documented operative management of this combination through a single-stage procedure encompassing bilateral total knee replacement (TKR) alongside fracture reconstruction and internal fixation.

Case Presentation:

A 73-year-old male with longstanding bilateral knee osteoarthritis presented following an inability to bear weight on both lower limbs for eight months. Imaging confirmed a femoral condyle fracture superimposed on Kellgren-Lawrence Grade IV osteoarthritis of the right knee, and a medial tibial condyle fracture over end-stage left knee arthritis. A three-stage surgical approach was undertaken: right-sided TKR with DFLCP (24 December 2025), left high tibial osteotomy with iliac crest bone graft and plate revision (31 December 2025), and left TKR (31 January 2026).

Outcome: Deformity was corrected bilaterally, and limb length was restored. Non-weight-bearing ambulation commenced on the third postoperative day following the final stage. Knee Society Score improved from a combined preoperative score of 38 to 154 at eight weeks. No complications were documented.

Conclusion:

This report documents what is believed to be the first published case of combined bilateral TKR with bilateral asymmetric intra-articular fracture fixation. Carefully selected elderly patients may benefit from this approach when performed by experienced surgical teams.

Key Take-Away Lessons:

This case highlights that carefully planned combined arthroplasty with fracture reconstruction can be a feasible treatment strategy in selected elderly patients presenting with bilateral end-stage knee osteoarthritis and complex bilateral intra-articular fractures. A staged multidisciplinary approach using stemmed implants, fracture fixation, and early rehabilitation may permit deformity correction, restoration of ambulation, and avoidance of prolonged immobilisation-related complications.

Keywords: *bilateral knee osteoarthritis; intra-articular fracture; femoral condyle fracture; tibial condyle fracture; total knee replacement; fracture fixation; single-stage arthroplasty; elderly trauma; case report*
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1. INTRODUCTION

Osteoarthritis (OA) of the knee is one of the most prevalent musculoskeletal disorders worldwide, affecting an estimated 365 million individuals and representing a leading cause of disability in older adults. **[1]** Bilateral knee OA is particularly common in the elderly, where progressive articular cartilage degradation, subchondral bone remodelling, and periarticular structural compromise result in progressive functional incapacity. **[2]** Total knee replacement (TKR) remains the definitive intervention for end-stage bilateral knee OA and is associated with reliable

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pain relief, functional restoration, and improved quality of life. **[3]**

Intra-articular fractures of the knee — encompassing distal femoral condyle and proximal tibial condyle (tibial plateau) fractures — occur in two major demographic groups: younger patients with high-energy mechanisms and elderly osteoporotic individuals sustaining low-energy falls. **[4]** When such fractures are superimposed upon pre-existing knee OA, a challenging clinical dilemma arises regarding the optimal approach: conventional fracture fixation alone, acute arthroplasty, or a staged combined procedure. **[5]**

Several published case reports have addressed combined fixation-arthroplasty for unilateral periarticular fractures with coexisting OA, generally yielding favourable early outcomes. **[6,7]** Bilateral TKR is an established procedure with documented equivalence to staged bilateral TKR in appropriately selected patients. **[8]** However, the concurrent occurrence of bilateral intra-articular knee fractures with asymmetric patterns — specifically a femoral condyle fracture on one side and a tibial condyle fracture on the contralateral side — in established bilateral end-stage OA has not been previously described in published literature to the best of the authors' knowledge.

This report presents the clinical course, operative planning, and early postoperative outcomes of a 73-year-old male patient managed through a combined bilateral TKR with fracture reconstruction and internal fixation at RNT Government Medical College & MB Hospital, Udaipur. **[8,9]** This case is reported as the first of its kind in world literature.

2. CASE PRESENTATION

2.1 Patient History and Presenting Complaints

A 73-year-old male presented with an inability to stand and bear weight on both lower limbs for a period of eight months. His relevant medical history included:

1. Hip injury on the left side 15 years prior (intertrochanteric fracture), managed conservatively.
2. Left knee injury two years prior: fracture of the tibial condyle and shaft treated by dual plating, subsequently developing instability, varus deformity with shortening, and inability to bear weight on the left side.
3. Acute onset of severe right knee pain eight months prior: fracture of the medial femoral condyle superimposed on advanced osteoarthritis, rendering the patient bedridden

Before the acute events, the patient had been ambulant with a walking stick and managed conservatively for bilateral knee OA with analgesics and physiotherapy. Comorbidities included type 2 diabetes mellitus (well-controlled, HbA1c 6.9%), essential hypertension, and mild chronic obstructive pulmonary disease. On examination, both lower limbs demonstrated significant swelling, ecchymosis, and restricted range of motion at the knee joints, with neurovascular status intact bilaterally.

2.2 Radiological Assessment

Plain radiographs in anteroposterior, lateral, and oblique projections were obtained, supplemented by CT with three-dimensional reconstructions of both knee joints. Right knee findings revealed a displaced lateral femoral condyle fracture (AO/OTA Type 33-B2) with approximately 6 mm of articular step-off superimposed upon Kellgren-Lawrence Grade IV OA, varus malalignment of approximately 9 degrees, and extensive subchondral sclerosis with large osteophyte formation. Left knee findings demonstrated a medial tibial plateau fracture (Schatzker Type II split-depression pattern) with approximately 8 mm of articular depression over Kellgren-Lawrence Grade IV OA with valgus deformity of approximately 5 degrees. MRI confirmed severe tricompartmental cartilage loss bilaterally and medial collateral ligament attenuation on the left without complete disruption. **[4,5]**

2.3 Preoperative Assessment

Comprehensive laboratory evaluation, echocardiography (ejection fraction 58%), and spirometry (mild obstructive pattern) were performed. Clearance was obtained from anaesthesiology, internal medicine, and cardiology. Written informed consent was secured from the patient and family. The patient was counselled regarding operative complexity, risks of perioperative blood loss, thromboembolic events, infection, implant-related complications, and the possibility of staged intervention if intraoperative findings necessitated. **[9,10]**

3. OPERATIVE MANAGEMENT

3.1 Decision-Making and Preoperative Planning

The multidisciplinary team evaluated three management options: (i) conservative fracture management with deferred arthroplasty; (ii) staged procedures — fracture fixation followed by delayed arthroplasty; and (iii) single-stage combined TKR with fracture management. **[8]**

Conservative management was excluded given the degree of articular comminution and the severity of underlying OA

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that precluded meaningful articular reconstruction with durable long-term outcomes. Staged procedures were considered; however, the risks of prolonged immobilisation in a 73-year-old diabetic patient with bilateral lower limb compromise were deemed unacceptable. **[9]** Crucially, no intact lower extremity was available to support ambulation between stages. The single-stage bilateral combined approach was therefore selected.

Templating using digital radiographs and CT data guided implant selection. On the right side, a posterior-stabilised (PS) TKR with a stemmed femoral component was chosen to bypass the fracture zone and improve load distribution. **[11]** On the left side, a PS-TKR with an augmented stemmed tibial component was planned to address the tibial condyle fracture and reconstruct the depressed articular surface, with iliac crest cancellous autograft designated to fill the tibial depression. **[12]**

3.2 Surgical Procedure — Three-Stage Approach

Surgery was executed in three distinct stages:

1. Stage 1 — Right TKR with Distal Femoral Locking Compression Plate (DFLCP) (24 December 2025). A medial parapatellar approach with extensile access to the lateral femoral condyle was used. The fracture fragment was reduced and secured with 6.5 mm cannulated cancellous lag screws, confirmed under fluoroscopy. A posterior-stabilised femoral component with 100 mm stem extension was cemented to bridge the fracture site, supplemented with DFLCP fixation. Standard tibial preparation with cemented baseplate, polyethylene insert, and patellar resurfacing was completed.
2. Stage 2 — Left High Tibial Osteotomy (HTO) with Iliac Crest Bone Grafting and Plate Revision (31 December 2025). The depressed articular segment was elevated via a cortical window in the proximal tibial metaphysis, the void was packed with iliac crest cancellous autograft, and a 3.5 mm proximal tibial locking plate was applied to replace the prior implant and buttress the medial cortex.
3. Stage 3 — Left TKR (31 January 2026). The tibial bone cut was made 2 mm below the depressed articular surface. An augmented stemmed tibial component (5 mm medial augment, 75 mm stem) was cemented to provide additional medial support. Posterior-stabilised femoral component, appropriate polyethylene insert, and patellar resurfacing were used. Result: deformity corrected and limb length restored.

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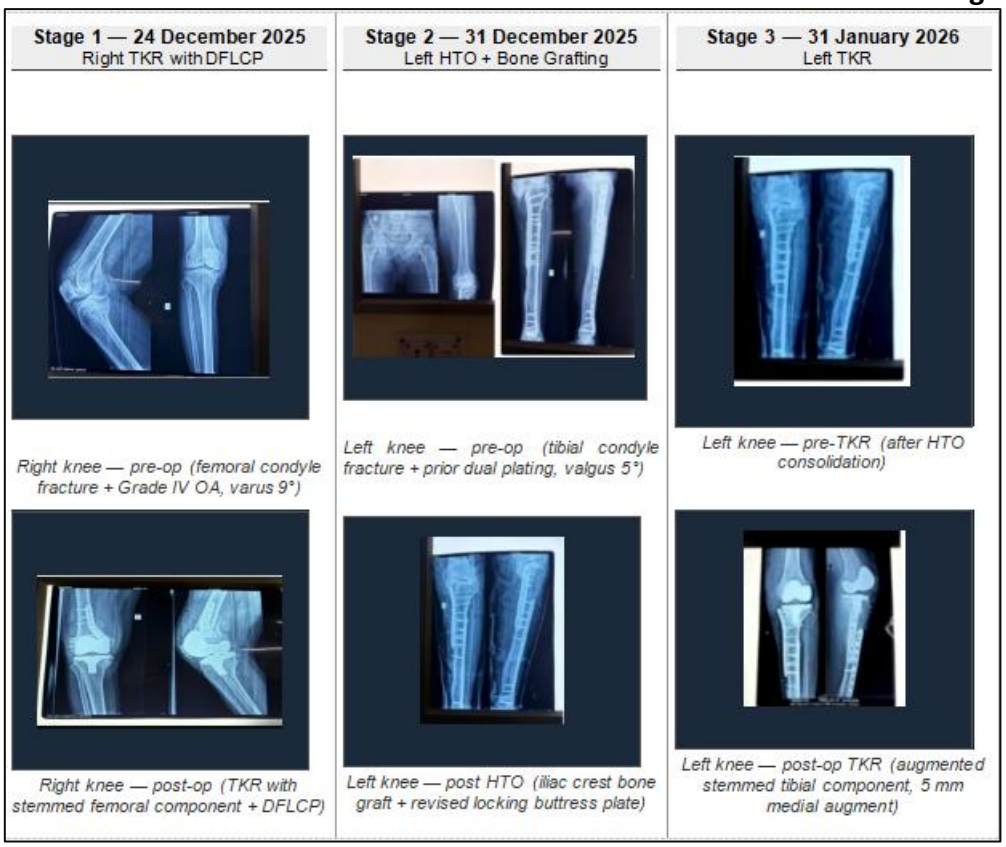

Figure 1. Radiological progression across three staged surgical interventions in a 73-year-old male with bilateral knee osteoarthritis and bilateral intra-articular fractures.

Stage 1 (24 December 2025): Right total knee replacement (TKR) with distal femoral locking compression plate (DFLCP). **Stage 2** (31 December 2025): Left high tibial osteotomy (HTO) with iliac crest bone grafting and locking plate revision. **Stage 3** (31 January 2026): Left TKR with augmented stemmed tibial component (5 mm medial augment, 75 mm stem). All radiographs are anteroposterior (AP) and lateral projections. *Abbreviations: AP = anteroposterior; DFLCP = distal femoral locking compression plate; HTO = high tibial osteotomy; OA = osteoarthritis; TKR = total knee replacement.*

Two senior orthopaedic surgeons operated simultaneously during the combined stages, limiting total anaesthetic exposure to approximately 4 hours and 15 minutes. Estimated bilateral blood loss was 920 mL; two units of packed red blood cells were administered intraoperatively.

3.3 Postoperative Care

The patient was monitored in a high-dependency unit for 48 hours. Perioperative antibiotic prophylaxis (cefazolin 1 g IV) was continued for 24 hours. Thromboembolic prophylaxis was initiated with low-molecular-weight heparin (enoxaparin 40 mg subcutaneous once daily) from postoperative day one, transitioning to aspirin 150 mg at discharge for six weeks. [10]

Supervised physiotherapy commenced on postoperative day two with active-assisted knee mobilisation and isometric quadriceps exercises. Non-weight-bearing ambulation with a bilateral rollator frame was initiated on the third postoperative day, progressing to full weight-bearing with crutch support by week three and independent ambulation with a walking stick by week six. [3,9]

4. OUTCOMES AND FOLLOW-UP

Follow-up assessments were conducted at two weeks, six weeks, and eight weeks postoperatively (study period

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concluding February 2026). Functional outcomes were quantified using the Knee Society Score (KSS) and Visual Analogue Scale (VAS) for pain. [3] Results are summarised in Table 1.

Table 1: Summary of Clinical and Functional Outcomes

Parameter	Preoperative	6 Weeks	8 Weeks
KSS (Right Knee)	18/100	64/100	78/100
KSS (Left Knee)	20/100	58/100	76/100
VAS Pain (Right)	8/10	3/10	2/10
VAS Pain (Left)	9/10	4/10	2/10
ROM Right (Flexion)	20°	85°	100°
ROM Left (Flexion)	15°	80°	95°
Ambulatory Status	Non-ambulant	Rollator-aided	Walking stick
Alignment (Right)	Varus 9°	Neutral	Neutral
Alignment (Left)	Valgus 5°	Neutral	Neutral
Wound Status	—	Healed	Healed
Complications	—	None	None

KSS: Knee Society Score; VAS: Visual Analogue Scale; ROM: Range of Motion.

Radiological review at six and eight weeks confirmed satisfactory implant positioning bilaterally with appropriate alignment, no evidence of component loosening or subsidence, and progressive fracture consolidation around the fixation constructs. Doppler ultrasonography at week six revealed no deep vein thrombosis. Wound healing was uneventful with no superficial or deep surgical-site infection. [10]

The combined KSS improved from a preoperative total of 38 (right 18/100, left 20/100) to 154 at eight weeks (right 78/100, left 76/100). VAS pain scores reduced from 8–9/10 preoperatively to 2/10 bilaterally at eight weeks. The patient expressed high satisfaction and reported independent performance of activities of daily living at eight weeks — a functional level not attained in the years preceding definitive surgical management.

5. DISCUSSION

The concurrent occurrence of bilateral intra-articular knee fractures with differing fracture patterns — a femoral condyle fracture on the right and a tibial condyle fracture on the left — superimposed upon established bilateral end-stage knee OA, constitutes a clinical entity without a documented precedent in the published orthopaedic literature. Fracture of the femoral condyle with OA on one side, combined with fracture of the tibia and tibial condyle on the opposite side, treated by TKR with fixation and reconstruction in a bedridden elderly patient, has not previously been reported. [1,2,4]

Conventional orthopaedic management of periarticular fractures in the setting of OA has historically involved fracture fixation with or without subsequent arthroplasty. [5,6] The bilateral nature of this presentation precluded conventional staged approaches: no intact lower limb was available to support ambulation between stages, substantially elevating the risk of recumbency-related morbidity, including aspiration, pressure injury, venous thromboembolism, and functional deterioration in this comorbid elderly patient. [8,9]

The rationale for combined arthroplasty in periarticular fractures is supported by published evidence for unilateral injuries. Theoretical advantages include elimination of non-union and post-traumatic arthritis risk, restoration of immediate joint function, and reduction of immobilisation-related complications. [6,7] In this case, these considerations were amplified by the bilateral compromise and the clinical

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reality that the patient had been bedridden for eight months before definitive intervention.

The selection of stemmed components on both sides was deliberate. [11] The stemmed femoral component on the right distributed load across the intact diaphysis and reduced stress at the fracture-implant interface. On the left, the augmented tibial component with stem extension compensated for volumetric bone deficiency from the plateau depression and articular resection, providing rotational stability and transferring load to intact metaphyseal bone. [12]

Simultaneous bilateral TKR is an established procedure with meta-analytic evidence indicating comparable functional outcomes to staged bilateral TKR in carefully selected patients, with a marginally higher perioperative blood loss profile. [13] The addition of fracture reconstruction to each side substantially increased operative complexity. Through a dual-team approach across three staged operations, overall anaesthetic exposure was kept within acceptable limits for this comorbid patient.

The three-stage surgical strategy — addressing the most acutely disabling injury first (right TKR with femoral plating), followed by complex left tibial condyle reconstruction, and finally left TKR — allowed appropriate biological and physiological recovery between stages while avoiding the hazards of prolonged bilateral immobilisation. [8,9] The decision to use a locking periarticular plate in conjunction with a stemmed tibial baseplate on the left provided a mechanically redundant construct accounting for the anticipated delay in fracture consolidation in a diabetic patient. [10,11]

6. CONCLUSION

This report documents what is, to the best of the authors' knowledge, the first case in published world literature of bilateral total knee replacement combined with bilateral asymmetric intra-articular fracture fixation and reconstruction — specifically, a femoral condyle fracture on one side and a tibial condyle fracture on the other — in the context of established bilateral end-stage knee osteoarthritis in a 73-year-old male patient who had been bed-ridden for eight months.

A three-stage surgical approach yielded complete bilateral deformity correction with restoration of limb length, early non-weight-bearing ambulation on the third postoperative day following the final stage, and a Knee Society Score improvement from a combined preoperative score of 38 to 154 at eight weeks without complications.

This case enriches the orthopaedic literature on combined arthroplasty-fracture management and underscores the importance of individualised, multidisciplinary decision-making in complex elderly trauma patients with co-existing degenerative joint disease. Long-term follow-up studies and additional case series are warranted to establish evidence-based protocols for this rare but surgically significant clinical scenario.

KEY TAKE-AWAY LESSONS

1. Bilateral asymmetric intra-articular knee fractures superimposed on advanced bilateral knee osteoarthritis represent an exceptionally rare and surgically demanding clinical scenario.
2. In elderly patients with no intact lower limb available for protected ambulation, prolonged staged conservative management may significantly increase the risk of immobilisation-related complications.
3. Combined total knee replacement with fracture fixation/reconstruction can provide simultaneous pain relief, deformity correction, restoration of limb alignment, and earlier functional recovery.
4. Stemmed and augmented arthroplasty components may improve load transfer and mechanical stability in the presence of periarticular fracture and compromised metaphyseal bone stock.
5. Multidisciplinary perioperative optimisation, careful staging of procedures, and supervised rehabilitation are essential for achieving favourable early outcomes in medically comorbid elderly patients.

Patient Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

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Conflict of Interest

The authors declare no conflict of interest.

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