

Intraoperative Proximal Fibula Fracture during Total Knee Arthroplasty for Moderate Valgus Knee Deformity: A Case Report

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Learning Point of the Article:

An intraoperatively identified proximal fibula fracture during total knee arthroplasty warrants assessment of fracture displacement, component position, knee stability, and peroneal nerve function. In this patient, short-term bracing, weight-bearing as tolerated, and early range of motion were followed by radiographic union and a satisfactory 1-year outcome.

Abstract

Introduction: Proximal fibular fracture is an uncommon complication of total knee arthroplasty (TKA), and published reports have largely described delayed or stress fractures. Evidence regarding management of intraoperatively detected proximal fibular fracture in a valgus TKA is limited.

Case Report: An undisplaced proximal fibular fracture was identified intraoperatively during total knee arthroplasty for valgus knee deformity in a 73-year-old female. Conservative management was pursued because the knee remained clinically stable. Fracture healing was evident at 3 months, and the patient recovered satisfactorily at 1 year without complications.

Conclusion: This case demonstrates that conservative management can be considered for an undisplaced proximal fibula fracture detected during TKA. The absence of fracture displacement and preserved knee stability guided non-operative management in this patient. Although this observation does not identify the causative maneuver or permit generalization of treatment decisions, it emphasizes recognition of the injury and assessment of fracture displacement, component position, knee stability, neurologic status, and appropriate pre-operative counseling.

Keywords: Total knee arthroplasty, valgus deformity, proximal fibula fracture, complication, osteoporosis.

Introduction

Normal coronal knee alignment is commonly described with reference to the mechanical axis of the lower limb. Valgus knee deformity is defined when this axis passes lateral to the center, and may be graded by the anatomic tibiofemoral angle as mild ($<15^\circ$), moderate ($15-30^\circ$) and severe ($>30^\circ$) [1,2,3]. Common causes include rheumatoid arthritis (RA), post-traumatic arthritis, rickets [3]. Total knee arthroplasty for valgus knee can provide reliable pain relief and good functional outcomes but

often presents technical challenges related to bone loss, contracted lateral soft tissues, ligament balancing, patellar tracking, and peroneal nerve protection [4,5,6,7,8,9,10,11]. Stress and insufficiency fractures after total knee arthroplasty (TKA) have been reported in the femoral neck, tibia, calcaneus, and metatarsals [12,13,14,15,16,17,18]. Intraoperative proximal fibula fracture during TKA is uncommon, with the available literature largely limited to delayed stress fractures, fibular head avulsion, and cases involving patients with RA [17,18,19,20,21].

Author's Photo Gallery



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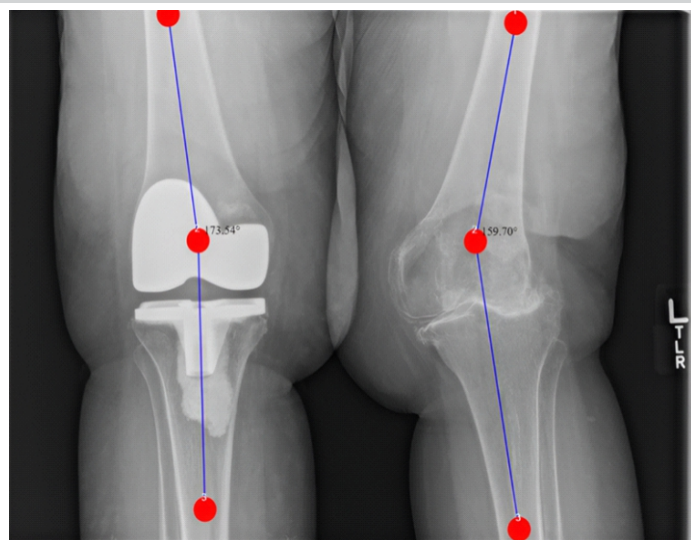


Figure 1: Pre-operative standing radiograph showing left valgus deformity and coronal alignment measurements.

We report an undisplaced proximal fibula fracture identified fluoroscopically during primary TKA for a moderate valgus deformity with clinical and radiologic follow-up at 1 year. The purpose of this report is to describe the presentation and management of this uncommon event rather than to infer causation or treatment superiority.

Case Report

A 73-year-old female presented with progressive left knee pain over several years, which was refractory to conservative therapy. She had a history of right sided TKA done 8 months prior. Her medical history included gout, osteoporosis, chronic kidney

disease, coronary artery disease, and congestive heart failure. She used a walker for ambulation.

Clinical findings

Physical examination and diagnostic assessment

The left knee demonstrated a correctable valgus deformity, stable ligamentous examination, intact distal neurovascular status. Her range of motion (ROM) from 5° to 110° with a pre-operative Knee Injury and Osteoarthritis Outcome Score for Joint Replacement (KOOS-JR) score of 54.8. Knee radiographs showed Kellgren-Lawrence grade 4 osteoarthritis and an anatomic tibiofemoral angle of approximately 159°, representing approximately 15° of valgus relative to the contralateral post-operative alignment of approximately 174° (Fig. 1). Pre-operative dual-energy X-ray absorptiometry (DEXA) measurements documented T-scores of -2.5 at the left femoral neck, -3.0 at the left total hip, -2.9 at the right femoral neck, and -2.9 at the right total hip, confirming pre-existing osteoporosis.

Therapeutic intervention

We performed a primary left TKA using a standard medial parapatellar approach and a Zimmer Biomet Persona medial-congruent bearing prosthesis. Distal femoral cut was made in 3° of valgus to address the deformity. The correction and lateral balancing sequence consisted of osteophyte removal, release of the posterolateral capsule, and pie-crusting of the iliotibial band. No additional lateral soft-tissue release was performed. After trialing and cementation, the knee was stable to varus-

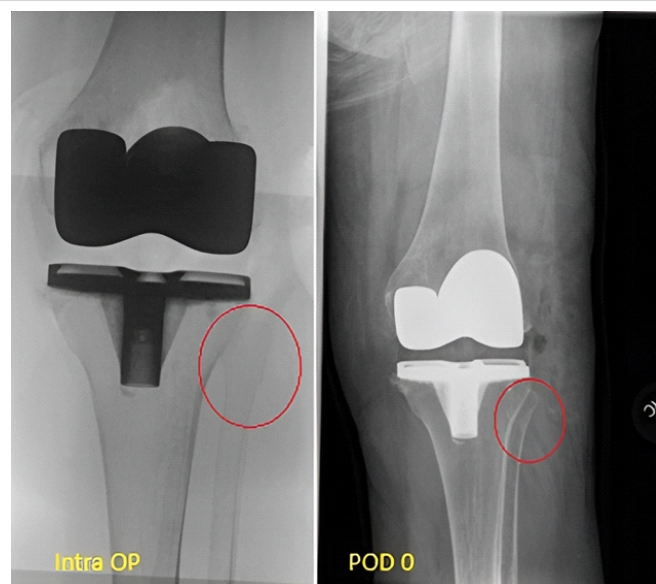


Figure 2: Intraoperative fluoroscopy and immediate post-operative radiograph showing the proximal fibula fracture.

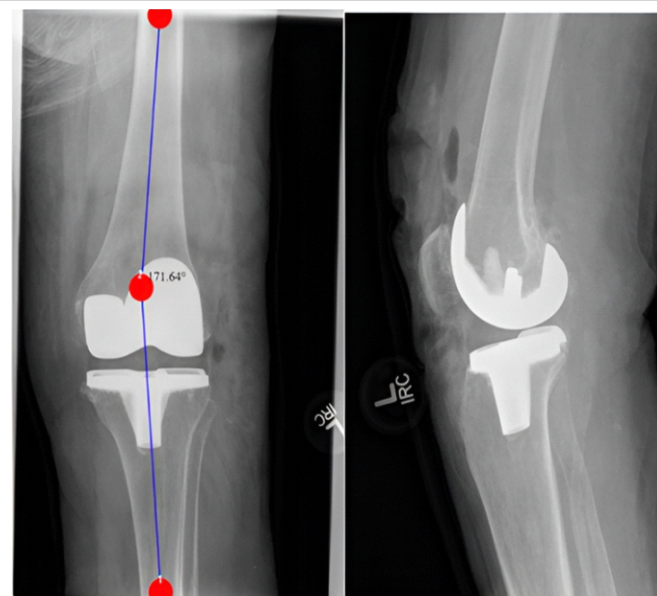


Figure 3: Two-week standing radiographs showing near-neutral post-operative alignment.

Knee ROM at 1 year Post op

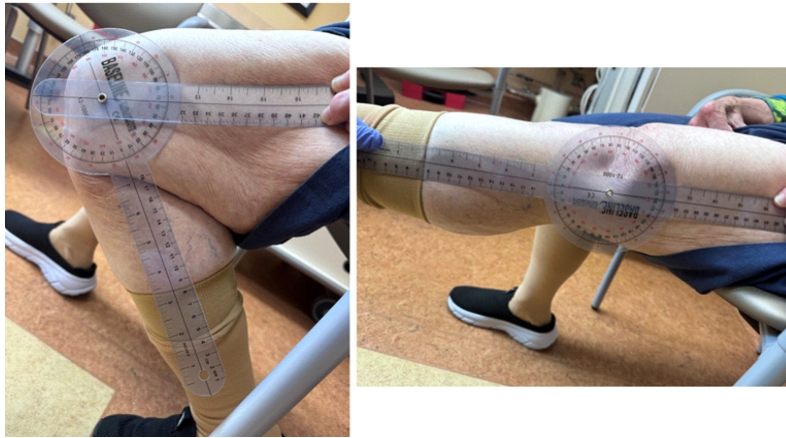


Figure 4: One-year clinical photographs showing full knee flexion and extension.

valgus and anteroposterior stress throughout the ROM. Fluoroscopy after component placement revealed an undisplaced fracture at the proximal fibular head-neck junction (Fig. 2). As the fracture was undisplaced and both component position and knee stability were preserved, non-operative management was selected. The patient was allowed to bear weight as tolerated immediately, perform active knee range-of-motion exercises, and mobilize in a knee brace. The brace was discontinued after 2 weeks, and no additional rehabilitation restrictions were imposed. Post-operative distal neurovascular examination was normal.

Follow-up and outcomes

Serial radiographs demonstrated progressive callus formation without displacement, and the fracture was considered radiographically healed by 3 months. The early post-operative alignment was maintained, with an anatomic tibiofemoral angle of approximately 172° on the 2-week standing radiograph (Fig. 3). At the 1-year follow-up, the patient reported no proximal fibular pain, fracture-related symptoms, or pain during activities of daily living. She was very satisfied with the result and had a KOOS-JR score of 84.6/100. Examination showed knee ROM from 0° to 117° and no instability to varus-valgus or anteroposterior stress (Fig. 4 and Video 1). Peroneal motor and sensory function were intact. No instrumented or dynamometric strength testing was performed. She walked without an assistive device at home and continued to use a walker outdoors. She could negotiate the steps required when traveling to the hospital. Standing anteroposterior and lateral

radiographs at 1 year showed a healed proximal fibula fracture, maintained TKA component position and alignment, and no evident interval fracture displacement (Fig. 5). No computed tomography or magnetic resonance imaging was obtained because clinical and serial radiographic assessments were considered sufficient for routine follow-up. Complete timeline of the patient's clinical history and follow-up is summarized in Table 1.

Video 1: Clinical video demonstrating active knee range of motion and functional recovery at 3-month follow-up.

Patient perspective

The patient initially expressed concern when informed of the fracture but understood the rationale for non-operative treatment after the stability of the fracture and knee were explained. At approximately 1 year, she reported no fibular symptoms or pain during daily activities was very satisfied with the outcome, walked without assistance at home, and continued to use a walker outdoors.

Discussion

Proximal fibula fracture after TKA is rarely reported. Vaish et al. described a fatigue fracture 14 years after TKA in a patient with RA; Takai et al. reported a stress fracture 7 weeks after TKA in a patient with severe valgus deformity and RA; Robati et al. described an acute presentation 5 weeks after TKA; and Phadnis et al. reported perioperative fibular head avulsion

Table 1: Clinical history and follow-up

Time	Finding/Intervention
Preoperative	Progressive left knee pain, History of right TKA, correctable approximately 15° valgus deformity; ROM 5–110°; KOOS-JR 54.8/100, documented osteoporosis on DEXA.
Day 0	Left TKA, Intraoperative proximal fibula fracture identified fluoroscopically, satisfactory component placement and stable knee
Day 1	Weight-bearing as tolerated; active, unrestricted knee ROM in a brace was permitted
2 weeks	Brace discontinued, standing alignment approximately 172°; no additional rehabilitation restrictions
3 months	Radiographic union without displacement or fracture-related complication.
1 year	ROM 0–117°; stable knee; intact peroneal motor and sensory function; no fibular symptoms; KOOS-JR 84.6/100; radiographs showed maintained union and component position.

KOOS-JR: Knee injury and osteoarthritis outcome score for joint replacement, TKA: Total knee arthroplasty, ROM: Range of motion, DEXA: Dual-energy X-ray absorptiometry

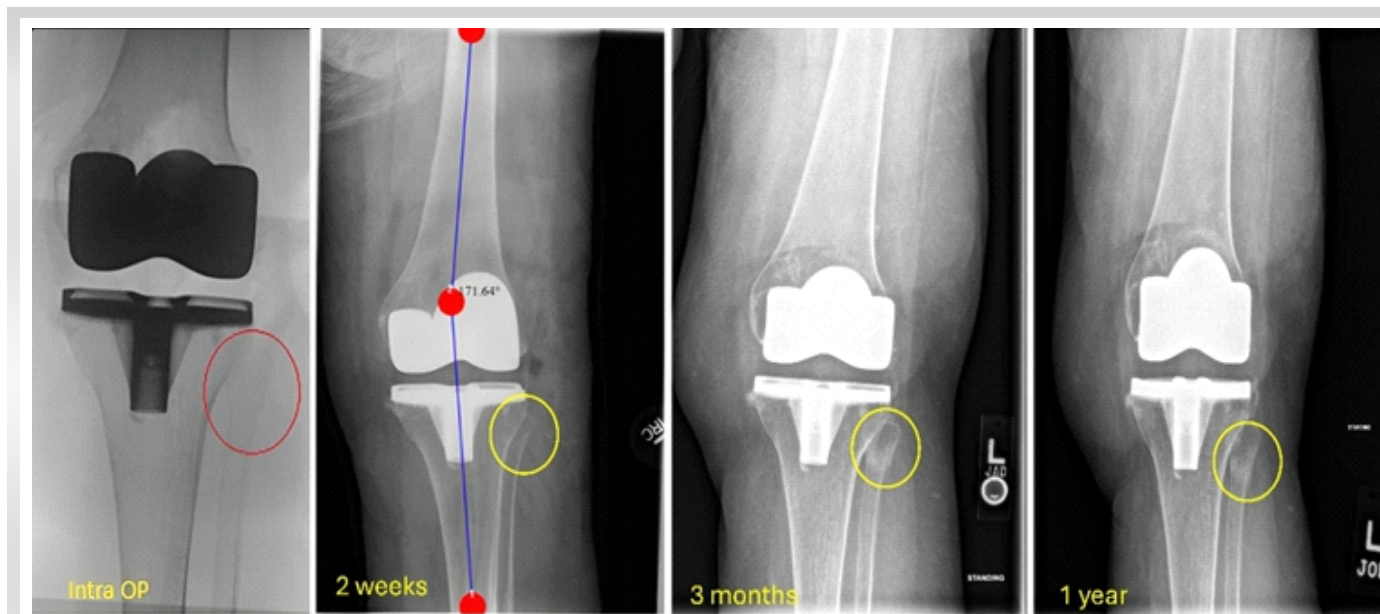


Figure 5: Serial radiographs demonstrating progressive healing of the proximal fibular fracture from intraoperative imaging through 1-year follow-up.

[18,19,20,22]. More recently, Chappidi et al. reported a proximal fibula fracture diagnosed intraoperatively during TKA for a valgus knee after an audible pop raised suspicion of the injury. Their report discussed the potential mechanism and management of this uncommon complication [18,19,20,21,22].

The present case adds to the limited literature on intraoperative proximal fibula fractures during TKA. Although valgus correction, transient hyperextension, cementation, or force transmission through the lateral collateral ligament, biceps femoris, popliteus, and other proximal fibular attachments are biomechanically plausible contributors, the mechanism cannot be established from this observation alone [23]. Bone fragility may also have contributed, as prior DEXA measurements confirmed osteoporosis, while chronic kidney disease, gout, advanced age, and limited baseline mobility may have further affected bone health or loading [24,25,26,27].

More broadly, intraoperative periprosthetic fractures during primary TKA are uncommon, with reported incidences ranging from approximately 0.2–4.4%; tibial intraoperative fractures have been reported in approximately 0.1–0.5% of cases. Management depends on fracture location and morphology, implant stability, and associated soft-tissue or ligamentous injury. Stable, non-displaced fractures with well-fixed components may be managed non-operatively with protected weight-bearing and progressive ROM, whereas unstable or displaced fractures generally require fixation or modification of the reconstruction [28,29,30].

In this present case, non-operative management with short-term bracing, weight-bearing as tolerated, and active motion

resulted in successful radiographic union and a satisfactory 1-year clinical result. This outcome supports non-operative care as a reasonable option in a carefully selected, stable fracture; however, it does not demonstrate equivalence or superiority to surgical management. Displacement, implant instability, ligamentous instability, progressive fracture propagation, neurologic deficit, or inability to mobilize would require individualized reassessment and may alter management.

This report has several limitations. This single case lacks a control group and cannot establish generalizability, causation, independent risk factors, or the comparative effectiveness of conservative treatment. Multiple comorbidities and osteoporosis precluded identification of the principal contributor. The use of a single implant system, surgeon-specific technique, and limited follow-up further restricts broader and long-term conclusions.

Conclusion

An undisplaced proximal fibula fracture can occur and be recognized intraoperatively during TKA for a valgus knee. In this patient, preserved component and knee stability supported non-operative management, followed by radiographic union, good Knee ROM, and a favorable KOOS-JR score at approximately 1 year. The report principally emphasizes recognition, assessment of displacement and stability, and individualized treatment.

Clinical Message

When an intraoperative proximal fibula fracture is identified during TKA, management should be based on fracture displacement, implant position, knee stability, neurologic findings, bone quality, and the patient's ability to mobilize. Short-term bracing with weight-bearing as tolerated was successful in this stable, undisplaced fracture, but broader preventive or treatment recommendations require larger studies.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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