Case Report *Open Access*

Journal of Innovative Clinical Trials and Case Reports

ISSN: 3068 - 1936

DOI: *doi.org/10.63721/26JCTC0132*

Non-Traumatic Anterior Knee Dislocation due to Advanced Osteoarthritis: A Case Report

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Citation: Riven Ragunandan, Tapeshwar Ajodha, Ryan Issari (2026) Non-Traumatic Anterior Knee Dislocation due to Advanced Osteoarthritis: A Case Report. J. of Inn Clin Trail Case Reports 2(1), 1-6. WMJ/JCTC-132

Abstract

Introduction: *Knee dislocations are rare injuries that typically result from high-energy trauma. However, the occurrence of non-traumatic anterior knee dislocations, particularly in the context of severe osteoarthritis (OA), is an extremely novel condition that is under-reported in the literature. This case report emphasizes the importance of early recognition and careful surgical planning for patients presenting with knee dislocation due to degenerative changes. The surgical approach must account for severe posterior tibial plateau wear, ligamentous insufficiency, and mechanical instability. Proper assessment and implant selection are crucial to achieving successful outcomes.*

Case Presentation: *A 58-year-old female patient with severe bilateral knee osteoarthritis and genu varus deformity developed a non-traumatic anterior knee dislocation due to posterior tibial plateau wear. The patient had a high Body Mass Index (BMI) of 47.5 and significant long-standing knee pain. Her left knee showed restricted range of motion (0–90 degrees). Radiographs revealed Kellgren and Lawrence grade 4 OA, posterior tibial wear, and non-traumatic anterior dislocation. The decision was made to proceed with left total knee replacement (TKR) using a constrained condylar knee prosthesis with stem extensions, posterior augments, and a central tibial cone to restore stability.*

Conclusion: *This case highlights a novel condition of non-traumatic anterior knee dislocation in the setting of severe OA, resulting from advanced posterior tibial plateau wear. The condition requires extensive surgical planning, including accurate imaging and careful implant selection. With proper intervention, patients can experience significant improvement in knee function and reduced pain, even in complex cases of degenerative knee instability.*

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Submitted: 02.02.2026 **Accepted:** 09.02.2026 **Published:** 25.02.2026

Abbreviations

BMI: Body Mass Index
OA: Osteoarthritis
ACL – Anterior Cruciate Ligament
TKR: Total Knee Replacement

Introduction

Anterior knee dislocations are rare injuries, commonly occurring due to high-energy trauma such as motor vehicle accidents or sports-related injuries [1]. These injuries often lead to significant damage to the knee's ligaments, bones, and soft tissues. However, non-traumatic anterior knee dislocations, particularly in the context of severe osteoarthritis (OA), are exceedingly rare and are not well documented in the literature. In these cases, the dislocation is not the result of a sudden trauma, but rather a gradual degenerative process involving posterior tibial plateau wear and ligamentous insufficiency. This phenomenon requires careful surgical planning and a detailed understanding of the complex biomechanical forces acting on the knee joint [2, 3].

Osteoarthritis is the most common cause of knee pain in older individuals, characterized by progressive cartilage loss, subchondral bone sclerosis, and the formation of osteophytes [4]. As the disease progresses, joint stability is compromised due to both bone changes and ligamentous laxity. The absence of an intact ACL – Anterior Cruciate Ligament, coupled with posterior bone wear, leads to anterior translation of the tibia, resulting in anterior tibiofemoral dislocation in some rare cases. This process can be exacerbated by factors such as genu varus deformity and high BMI, which alter the biomechanical axis of the knee and place additional stress on the joint [5].

The occurrence of non-traumatic knee dislocations in degenerative cases is not well understood. Previous studies have highlighted traumatic knee dislocations as a common occurrence, with treatment modalities focused on ligamentous repair and reduction in the acute phase [6, 7]. In contrast, cases of non-traumatic knee dislocation have been associated with joint instability resulting from severe degenerative changes such as posterior tibial plateau wear. In patients with advanced OA, the ACL may become attenuated, and the tibia may undergo changes that alter its positioning relative to the femur, ultimately leading to a dislocation under minimal force [8]. The mechanism of posterior tibial plateau wear leading to anterior knee dislocation remains poorly documented but may become more common as the population ages and OA becomes more prevalent.

While it is widely understood that ACL insufficiency and ligamentous laxity contribute to knee instability in OA, anterior tibial translation resulting in dislocation is rarely discussed in the literature. In most instances, severe OA leads to joint deformities, such as varus/valgus deformities, but not to a complete anterior tibiofemoral dislocation without trauma. The mechanism of posterior tibial plateau wear leading to anterior knee dislocation, therefore, represents a novel pathway to knee instability, one that requires careful consideration and significant surgical planning [9]. Additionally, knee dislocations in the elderly have been associated with increased comorbidities, including higher BMI and genu varus, which further exacerbate joint instability and complicate management [10].

In cases like this, where there are severe posterior tibial wear and ligamentous insufficiency, the knee prosthesis selection becomes crucial. Traditional unconstrained knee prostheses may fail to provide adequate stability in the presence of significant bone loss and initial instability, making the use of a constrained condylar knee prosthesis necessary. This approach is designed to provide enhanced stability and maintain joint alignment, particularly when the knee's natural stabilizing mechanisms have been compromised [1, 3].

Case Presentation

A 58-year-old female with a history of long-standing bilateral knee pain and severe osteoarthritis presented

with a non-traumatic anterior knee dislocation of the left knee. [Fig 1] Her comorbidities included morbid obesity (BMI 47.5) and hypertension. She described a progressive decline in function over several years, with the left knee consistently more symptomatic than the right. She denied any preceding fall, twisting injury, or other acute traumatic event, and reported that her deterioration had been gradual, characterised by worsening pain, increasing deformity, and progressive difficulty with ambulation. At presentation, she mobilised with two crutches and was significantly limited in distance and endurance. She reported mechanical symptoms and a sense of instability.

Figure 1: Clinical Photos of Bilateral Lower Limbs

On clinical examination, she had an obvious deformity of the left knee with abnormal tibiofemoral alignment consistent with chronic dislocation and genu varus. There was global tenderness about the joint line, and assessment of active and passive movement demonstrated a restricted range of motion of 0–90 degrees. Ligamentous examination revealed grade 2 medial collateral ligament and grade 2 lateral collateral ligament insufficiency, consistent with chronic coronal plane laxity. The extensor mechanism was clinically intact. Importantly, neurovascular examination was normal, with palpable distal pulses, normal capillary refill, and intact motor and sensory function distally.

Radiographic assessment demonstrated bilateral tricompartmental osteoarthritis, consistent with Kellgren and Lawrence grade 4 changes. The left knee showed severe degenerative changes with marked osteophyte formation, joint space obliteration, and substantial tibial plateau bone loss. There was significant posterior tibial plateau wear, and the tibia was positioned in a chronically anteriorly dislocated relationship relative to the distal femur. In addition, imaging demonstrated evidence of a healed proximal fibular stress fracture, likely secondary to longstanding malalignment and instability with abnormal load transfer. The right knee also demonstrated advanced tricompartmental osteoarthritis, but without dislocation. [Fig 2]

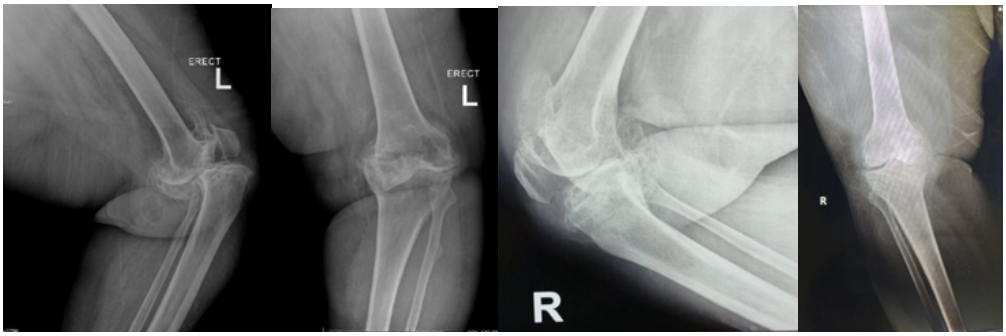

Figure 2: Pre-Operative Anteroposterior and Lateral Knee Radiographs

Given the combination of advanced osteoarthritis, chronic instability, substantial tibial bone loss, and anterior tibiofemoral dislocation, operative management was considered. The goals of surgery were to restore alignment, achieve a stable tibiofemoral articulation, address bone loss, and improve pain and function. The patient

was counselled regarding the complexity of the reconstruction, the anticipated need for augments and stems, the risk of perioperative complications (including infection, thromboembolism, stiffness, and periprosthetic fracture), and the likely staged approach to the contralateral knee at a later date. After discussion and shared decision-making, the decision was made to proceed with left total knee replacement as the only viable option for durable pain relief and functional restoration.

Intra-operatively, a midline skin incision was made and the knee was approached via a medial parapatellar arthrotomy. Exposure confirmed severe degenerative disease with extensive osteophytes, which were removed to improve mobility, facilitate balancing, and allow accurate assessment of bone loss. Following standard distal femoral and proximal tibial preparation, the extent of tibial deficiency was fully appreciated. The tibial plateau demonstrated approximately 65% posteromedial bone loss, which was particularly evident after the tibial cut, confirming the structural basis for the chronic anterior dislocation and instability. [Fig 3] Given the collateral ligament insufficiency and the magnitude of bone loss, a constrained condylar knee prosthesis was selected to provide increased stability compared with a posterior-stabilised design while avoiding a fully hinged construct. The tibial reconstruction utilised a stem extension for load-sharing and fixation, a central metaphyseal cone to address bone deficiency and improve metaphyseal support, and posterior augments to restore the posterior tibial offset and re-establish an appropriate tibial platform. [Fig 4] A femoral component with a stem extension was implanted to enhance stability and fixation. Trial components were inserted, and careful attention was paid to restoration of alignment, assessment of flexion-extension gaps, and soft tissue balancing to achieve a stable knee throughout the range of motion. Following definitive implantation and insertion of the polyethylene liner, the knee was stable and tracked well. The wound was irrigated, haemostasis achieved, and the arthrotomy and soft tissues were closed in layers.

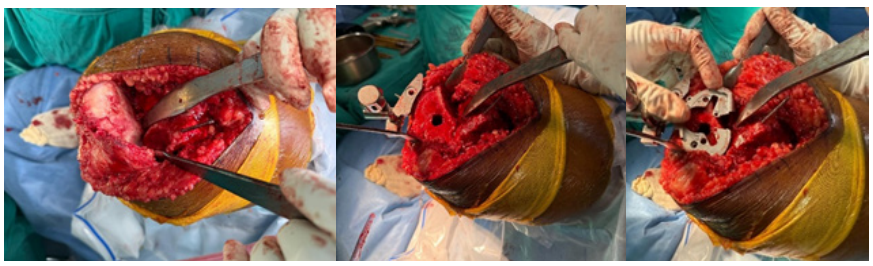

Figure 3: Intra-Operative Clinical Pictures Pre and Post Tibial Cuts

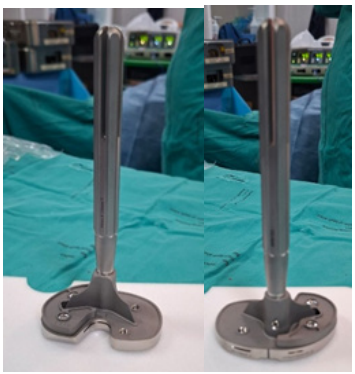

Figure 4: Image of the Tibial Component with the Stem Extension and posteromedial Augments

Post-operatively, radiographs confirmed satisfactory component position, restoration of alignment, and stable reduction of the tibiofemoral joint. [Fig 5] Thromboprophylaxis was commenced in keeping with institutional protocol. Given the metaphyseal reconstruction and the need to protect osseointegration and healing in the context of poor bone quality and previous stress injury, the patient was kept non-weight bearing for six weeks, with supervised physiotherapy focusing on range of motion and quadriceps activation. At two weeks, the wound had healed uneventfully. At her two-month follow-up, she reported marked symptomatic improvement

with minimal pain and improved confidence in the limb. She continued to mobilise with crutches but noted improved stability and function. Clinical examination demonstrated a range of motion of 0–120 degrees, with a stable knee and no neurovascular deficits. Overall, she was satisfied with the outcome and reported meaningful improvement in quality of life.

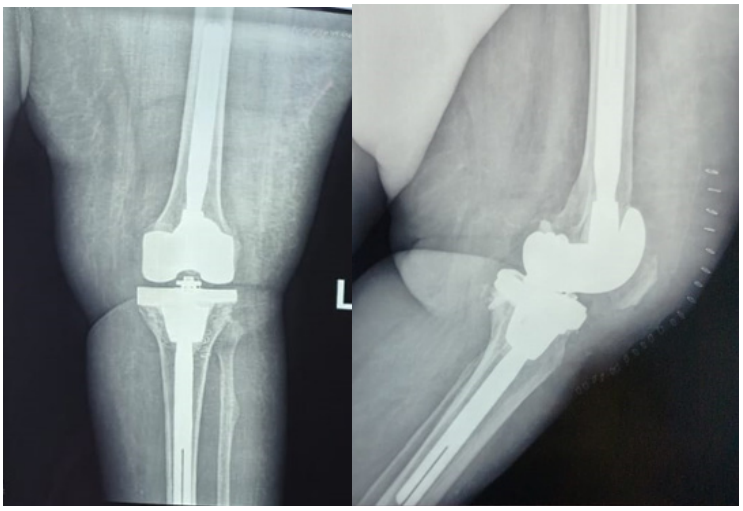

Figure 5: Post Operative Left Knee Anteroposterior and Lateral Radiographs

Discussion

This case demonstrates the rare occurrence of a non-traumatic anterior knee dislocation in a patient with severe osteoarthritis and posterior tibial plateau wear, highlighting a novel mechanism for knee instability. While anterior knee dislocations are typically traumatic, degenerative changes, particularly posterior tibial wear, can lead to joint instability and dislocation without trauma. This condition requires significant surgical planning, as the presence of bone loss, ligamentous insufficiency, and joint deformity complicates the management approach.

In the literature, Citak et al. (2013) presented a similar case of non-traumatic anterior knee dislocation in a patient with osteoarthritis. However, in their case, they opted for a hinged knee prosthesis due to severe ligamentous instability and bone loss, which required a more constrained solution [1]. This approach was also necessary in our case, as the patient's posterior tibial bone loss and ligamentous laxity demanded a solution that would provide sufficient stability and joint alignment. We chose to use a constrained condylar knee prosthesis with stem extensions, posterior augments, and a central cone to restore knee function and prevent further instability.

The surgical choice of a constrained knee prosthesis was pivotal to ensuring joint stability in the presence of posterior tibial wear. This decision aligns with the principles demonstrated by Citak et al., who also faced significant bone loss and instability, opting for a hinged prosthesis to prevent joint dislocation and provide long-term functional restoration [1]. While both approaches differ in terms of prosthetic design, the underlying principle is the same: providing adequate stability in the presence of severe osteoarthritis and ligamentous insufficiency.

The outcome of this case, which included improved range of motion and minimal pain, further supports the importance of careful implant selection in complex knee surgeries. A hinged prosthesis or constrained condylar knee prosthesis is essential in cases of severe OA, where bone loss and ligament instability compromise joint stability. This case underscores the need for accurate preoperative imaging to assess the degree of bone loss and guide the surgical approach, ensuring that the patient achieves functional recovery despite the complexity of the condition.

Additionally, studies have shown that knee dislocations, especially in elderly patients with significant degenerative changes, present particular challenges due to multiple comorbidities, such as high BMI, which can negatively impact surgical outcomes and recovery [8, 10]. This emphasizes the need for individualized treatment plans in complex cases of knee dislocation in OA.

Non-traumatic anterior knee dislocation in the context of severe OA and posterior tibial plateau wear is a novel and under-reported condition, requiring significant surgical planning and implant selection. Both Citak et al. and our case highlight the importance of constrained prosthetic solutions in addressing complex knee dislocations with significant degenerative changes [1].

Conclusion

This case highlights a novel condition of non-traumatic anterior knee dislocation in the setting of severe osteoarthritis and posterior tibial plateau wear. It underscores the importance of accurate preoperative imaging to assess bone loss and joint instability, guiding the surgical approach. The choice of a constrained condylar knee prosthesis with stem extensions, posterior augments, and a central cone proved effective in restoring joint stability and achieving functional recovery despite the complex degenerative changes.

Clinical Message

Non-traumatic anterior knee dislocation in severe osteoarthritis is a rare and novel condition that requires early recognition and extensive surgical planning. Accurate imaging and the appropriate implant selection are essential to restore joint stability and function in complex cases.

Learning Points

This case highlights the rarity of non-traumatic anterior knee dislocation due to severe osteoarthritis and posterior tibial wear. Accurate imaging, careful implant selection and postoperative rehabilitation are essential for restoring stability and achieving functional recovery.

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