Case Report

A case report on Total Knee Arthroplasty in an young adult with Post-Traumatic Secondary Osteoarthritis with Fixed Flexion Deformity (ROM 0-5) and six months outcome

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ABSTRACT

This case report presents the management of a young adult with post-traumatic secondary osteoarthritis and a fixed flexion deformity ROM (0-5) of the knee, treated with total knee replacement (TKR). The patient, a 24-year-old male, sustained a complex intra-articular fracture of the knee following a high-energy trauma, which was initially managed by spanning external fixator and dislocation correction along with soft tissue repair. Despite surgical intervention, the patient developed progressive osteoarthritis and a fixed flexion deformity, leading to significant pain, functional impairment, and reduced quality of life. After exhausting conservative measures, including physical therapy and pharmacological management, the decision was made to proceed with TKR. Preoperative planning involved detailed imaging and assessment of bone stock, ligamentous stability, and deformity correction requirements. Intraoperatively, a posterior-stabilized prosthesis was implanted with meticulous soft tissue balancing and correction of the flexion contracture. Postoperatively, the patient underwent an intensive rehabilitation program, achieving full extension and a functional range of motion (ROM 0-130). At the 6-month follow-up, the patient reported marked improvement in pain relief, mobility, and overall function, with no complications.

This case highlights the challenges and considerations in performing TKR in young adults with post-traumatic osteoarthritis and fixed flexion deformity, emphasizing the importance of individualized surgical planning and rehabilitation to optimize outcomes in this complex patient population.

Keywords:*Total knee arthroplasty, Post-traumatic secondary Osteoarthritis, Fixed flexion deformity*

INTRODUCTION

Knee dislocations combined with complex open fractures are rare but severe injuries[1], often leading to long-term complications such as post-traumatic osteoarthritis (OA). Total knee replacement (TKR) is a widely used procedure for the treatment of Post Traumatic Osteoarthritis[2]. In this report, a 24-year-old male presented with a complex open fracture and knee dislocation, which, despite initial surgical intervention, developed into G-IV secondary OA with fixed flexion deformity (FFD) of the knee. The patient ultimately underwent total knee replacement (TKR) to restore function and relieve pain.

CASE PRESENTATION

The 24-year-old man sustained a high-energy traumatic injury resulting in a complex open fracture (Figure 1)and knee dislocation. Initial management involved emergent surgical intervention for fracture stabilization by spanning external fixator and dislocation reduction, along with soft tissue repair. Later on, he was treated withapplication of Illizarov ring fixator (shown in figure-2). Despite the surgical efforts, the patient developed progressive knee pain, limited range of motion, and a fixed flexion deformity (FFD) over several months, leading to significant

functional impairment. Radiographic assessment revealed secondary OA with joint space narrowing, osteophyte formation, and further deformity of the knee joint, which was significantly complicating the patient's mobility and quality of life.

MEDICAL HISTORY

A young 24 years old male patient sustained an open fracture dislocation of the right knee(shown in figure 1) in 31ST December 2024. He underwent treatment surgical toileting with wound debridement with application of spanning external fixator later on using the Illizarov ring fixator to stabilize the fracture and promote healing. Despite initial success, he developed post-traumatic secondary osteoarthritis leading to a fixed flexion deformity of the right knee.

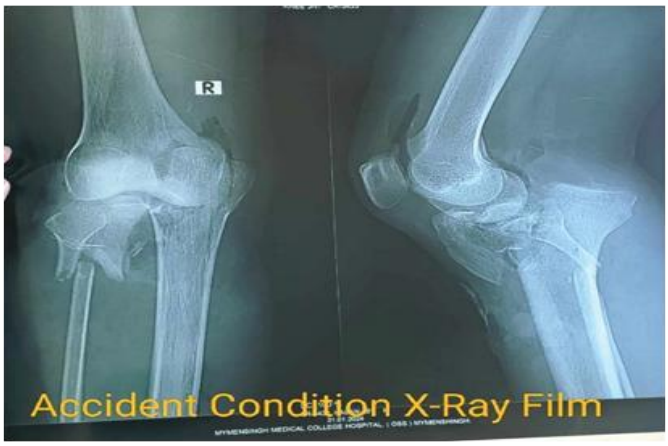

Figure 1: Xray of right knee both view showing fracture dislocation

Figure 2: Xray of right knee both view showing Illizarov ring fixator after 5 months of primary injury.

Upon Physical Examination for further evaluation, it was identified that his fixed flexion deformity (FFD) was approximately 0 to 30 degrees. There was no significant swelling or tenderness, but functional limitations were distinct. There was significant wasting of quadriceps group of muscle. There was both cruciate ligament injury and significant anterior and posterior translation and also presence of multiple scars of previous surgery. His distal Neurovascular Status was normal, indicating no associated Vascular compromise or neurological deficit.

IMAGING STUDIES

Radiological evaluations, including X-rays and CT scan confirmed the presence of advanced osteoarthritis changes.(shown in figure 3 & 4)

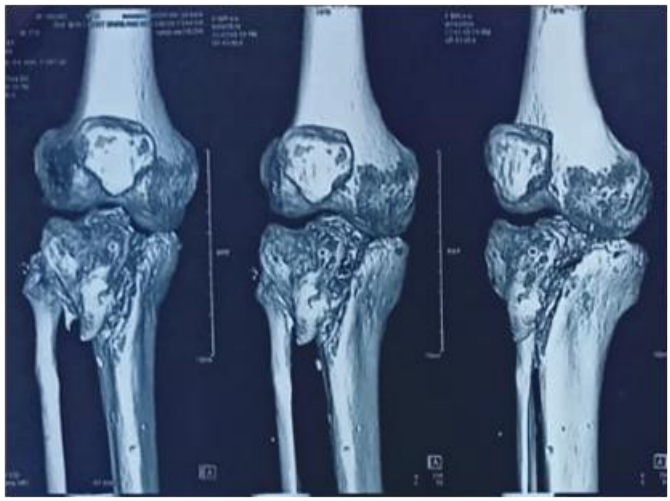

Figure 3: CT scan of Right knee 3D view showing malunited proximal tibia fracture with secondary advanced osteoarthritis

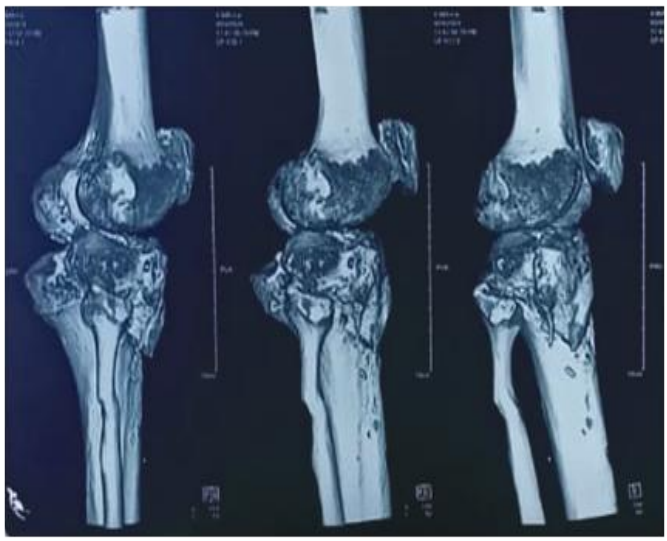

Figure 4: CT scan of right knee 3D view showing malunited proximal tibia fracture with secondary advanced osteoarthritis

Surgical Intervention & Procedure

TKR was done with a longitudinal incision through medial parapatellar approach. Sequential medial soft tissue release done with open arthrofibrolysis with ROM achieved 0-135 degree.

The surgery was conducted under combined spinal-epidural (CSE) anesthesia, and a posterior-stabilized prosthesis with extended tibial rod (showing in figure 5) to overcome the anterior posterior stability and to increase survivorship of the implant. After traditional bone cut and soft tissue balancing achieved with tibial implant. And the final implantation is done with laterization of tibial component to overcome the correct axis of the lower limb. There was no bone loss, and no bone grafting was needed. The primary stability ensured early mobilization.

Postoperatively, He was monitored closely in the recovery room, assessing vitals and surgical site integrity. A rehabilitation program was initiated promptly to promote mobility and strengthen the surrounding musculature. He started walking within 24 hours. His postoperative recovery was uneventful, with no complications i.e. infection or thrombosis. He began physical therapy on day two, emphasizing range of motion and strength exercises. He started walking with support within 48 hours of surgery.

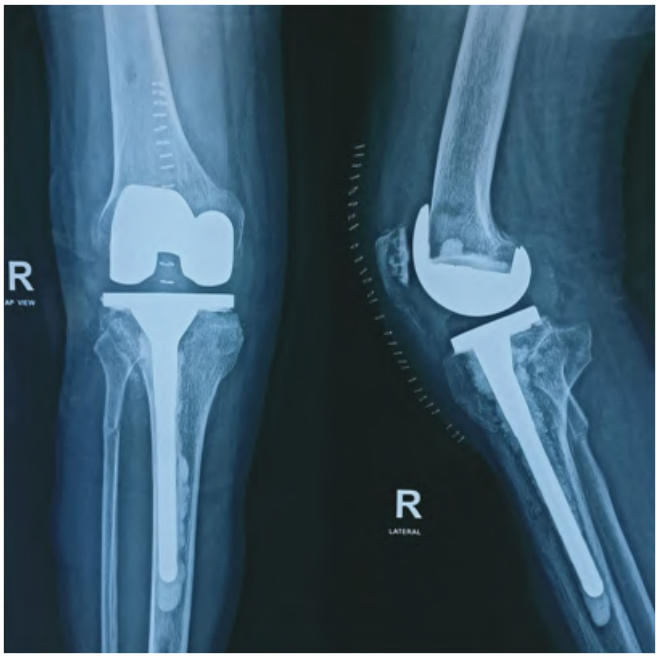

Figure 5: Xray right knee both view showing post operative state with posterior stabilized prosthesis with extended tibial rod.

Follow-Up Assessments:

At six weeks, he exhibited improved range of motion and reduced swelling. By six months, his range of motion reached 0 to 135 degrees, and he reported no pain during movement as shown in Figure 6.

Functional assessment indicated he could engage in daily living activities, including walking, climbing stairs, and performing routine tasks independently.

International Knee society score at 6 weeks' time:
KS-40 (Pain) + 45 (ROM) + 5 (Stability) = 90/100
Lysholm score -86/100
Visual Analog Scale (VAS) -02(mildpain or discomfort without affecting any function)

DISCUSSION

Total knee replacement can be a highly effective solution for young patients with debilitating knee conditions due to previous trauma[3]. This case illustrates the transformation achieved through TKR in someone with a complex history, emphasizing surgical intervention as a definitive treatment option for post-traumatic osteoarthritis. The outcomes seen in this patient highlight the importance of timely surgical intervention and postoperative rehabilitation in restoring quality of life for patients with limited knee function.

Figure 6: showing patient standing in full extension without support, 6 months after surgery

CONCLUSION

The successful outcome of the patient's total knee arthroplasty underscores the potential for significant functional recovery, despite prior complications from the Illizarov ring fixator and the development of secondary osteoarthritis. This surgical intervention has facilitated a notable restoration of mobility and function, enabling a return to routine activities of daily living. Ongoing post-operative monitoring is essential to assess the stability of his recovery and to evaluate long-term outcomes of knee arthroplasty in the younger population, particularly regarding the longevity of the prosthesis and potential complications.

REFERENCES

1. Browner BD, Jupiter JB, Krettek C, Anderson PA. Skeletal Trauma: Basic Science, Management, and Reconstruction. 5th ed. Philadelphia: Elsevier Saunders; 2015. p. 789-795
2. Insall JN, Scott WN. Surgery of the Knee. 5th ed. Philadelphia: Churchill Livingstone; 2012. p. 456-460.
3. Long WJ, Bryce CD, Hollenbeak CS, Benner RW, Scott WN. Total knee replacement in young, active patients: Long-term follow-up and functional outcome. J Bone Joint Surg Am. 2014;96(18):e159 . doi:10.2106/JBJS.M.01263.