

CASE REPORT

MANAGEMENT OF PERIPROSTHETIC DISTAL FEMORAL FRACTURE AFTER TOTAL KNEE ARTHROPLASTY USING MINIMALLY INVASIVE PLATE OSTEOSYNTHESIS: A CASE REPORT

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ABSTRACT: CONTEXT: The approximate incidence of periprosthetic supracondylar femur fractures after total knee arthroplasty ranges from 0.3 to 2.5 percent. Various methods of treatment of these fractures have been suggested in the past, such as conservative management, open reduction and plate fixation and intramedullary nailing. However, there were complications like pain, stiffness, infection and delayed union. Minimally invasive plate osteosynthesis (MIPO) is a relatively newer technique in the treatment of distal femoral fractures, as it preserves the periosteal blood supply and bone perfusion as well as minimizes soft tissue dissection. **AIM:** To evaluate the effectiveness of MIPO technique in the treatment of periprosthetic distal femoral fracture. **SETTINGS AND DESIGN:** In this study, we present a case report of a 54 year old female patient who sustained type 2 (Rorabeck et al. classification) periprosthetic distal femoral fractures after TKA. Her fracture fixation was done with distal femoral locking plates using minimally invasive technique. **METHODS AND MATERIAL:** We evaluated the clinical (using Oxford knee scoring system) and radiological outcomes of the patient till six months post-operatively. Radiologically, the fracture showed complete union and she regained her full range of knee motion by the end of three months. **CONCLUSION:** We conclude that MIPO can be considered as an effective surgical treatment option in the management of periprosthetic distal femoral fractures after TKA.

KEYWORDS: Periprosthetic fractures, Total knee arthroplasty, Distal femoral fractures, Minimally invasive surgery, Rorabeck et al. classification.

MESHTERMS: Arthroplasty, Replacement, Knee Bone Plates Femoral Fractures Incidence Knee Joint Pain Periprosthetic Fractures.

INTRODUCTION: The incidence of osteoarthritis of knee and its management by total knee arthroplasty (TKA) has increased over the past few years; however, the occurrence of periprosthetic fractures following total knee arthroplasty (TKA) is relatively uncommon. The approximate incidence of periprosthetic supracondylar femur fractures after total knee arthroplasty ranges from 0.3 to 2.5 percent.^[1,2] Most of the fractures around the TKA prosthesis occur in the supracondylar region of the femur although other regions such as patella and tibia have been reported.^[3,4] In the past, these fractures have been treated by various methods such as open reduction and plate fixation and intramedullary nailing while many others were treated conservatively. However, they were associated with complications such as pain, stiffness, infection and delayed union.^[5,6,7,8] Minimally invasive plate osteosynthesis (MIPO) is an effective method recently introduced in the treatment of distal femoral fractures following TKA. It preserves the periosteal blood supply and perfusion of the bone as it minimizes soft tissue dissection.^[9] The technique is effective in providing excellent clinical, radiological and functional outcomes with fewer complications.^[9]

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The aim of this study was to study the effectiveness of using MIPO technique in the management of periprosthetic fracture after TKA. We present a case report of a 54 year old female patient with type 2 (Rorabeck et al. classification)^[10] periprosthetic distal femoral fracture after TKA, treated with minimally invasive plate fixation.

CASE: A 54 years old lady presented with complaints of pain in the left knee and thigh and inability to stand or walk, following history of slip and fall at home. She had a history of undergoing total knee arthroplasty (TKA) for osteoarthritis of left knee five years ago. Adequate clinical examination and conventional radiographs were taken and she was diagnosed to have sustained type 2 periprosthetic fracture of left knee (Rorabeck et al. classification¹⁰) (Figure 1).

After proper pre-operative evaluation, she was posted for surgery and fracture fixation was achieved with distal femoral locking plate and screws using minimally invasive technique. She had an uneventful post-operative recovery assisted with physiotherapy exercises. Her immediate post-operative radiographs showed satisfactory fracture reduction and fixation (Figure 2).

Thereafter, she was followed up at regular intervals. She attained full range of knee motion by the end of three months with a satisfactory Oxford knee score of 42 (Figure 3).

Her radiograph at the end of six months showed complete union of the fracture (Figure 4).

DISCUSSION: Osteoarthritis of knee is a common condition found in present population and its management by total knee arthroplasty (TKA) has increased over the past few decades. The occurrence of periprosthetic fractures following total knee arthroplasty (TKA), however, is relatively uncommon. Most of the periprosthetic distal femur fractures following TKA occur between two and four years.^[2] The incidence of periprosthetic supracondylar femur fractures after TKA ranges from 0.3 to 2.5 percent.^[1,2] Supracondylar region of the femur is one of the common sites for a periprosthetic fracture following TKA, although other regions such as patella and tibia have been reported in the literature.^[3,4] Majority of these injuries are low velocity injuries combined with axial and rotational forces, while others occur from high-energy trauma.^[11]

One of the important steps in the management of such injuries is the classification the fracture pattern. The classification system provided by Rorabeck and Young is one of the most widely used classifications for periprosthetic fractures after TKA.^[10] It classifies the fracture pattern according to the displacement of the fracture fragments and the status of the prosthesis (intact or loose).

Type 1: Undisplaced fracture, prosthesis intact.

Type 2: Displaced fracture, prosthesis intact.

Type 3: Undisplaced or displaced fracture, prosthesis loose or failing.

The aim of the treatment, in type 2 periprosthetic fracture after TKA, is to attain satisfactory anatomical alignment and stability of the fracture fragments and to allow an early range of motion and bone healing ^[2,8]. In the past, these fractures have been managed conservatively as well as by surgical methods. Conservative management has been associated with high incidence of malalignment, delayed and non-union.^[2,8] It involves prolonged bed rest and immobilization of the limb which, in turn, results in joint stiffness.^[2,8] Hence, surgical management has been the treatment of choice for most of the displaced fractures as it permits adequate alignment and fixation of the fracture fragments and allows early mobilization of the knee joint.^[12]

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Various methods of internal fixation have been used in the past such as plate and screws and intramedullary nails. Conventional plate osteosynthesis with rigid fixation is associated with complications like infection, delayed union, non-union, hardware failure and re-fracture after plate removal.^[13] Osteoporosis, advanced age and psychological awareness of sustaining a fracture around the prosthesis are few other notable challenges in the management and rehabilitation of patients with such injuries.^[5] However, locking compression plate and screws has provided an alternative in the fixation of the fractures in osteoporotic patients with minimal disruption of the periosteal blood vessels. The combination of locking compression plate and the minimally invasive plate osteosynthesis (MIPO) technique has proved very effective in the treatment of periprosthetic distal femoral fractures as it maintains reduction and anatomical alignment of the fracture while minimizing soft tissue dissection.^[9,12] It provides excellent functional and radiological results with fewer complications.^[12] It also eliminates the need for bone grafting.^[14]

The patient should be followed up at regular intervals till bony union is achieved. Absence of fracture site tenderness on clinical examination and continuity of at least three out of four cortices on the anteroposterior and lateral radiographs signifies bony union. The patient's functional recovery can be tested with the help Oxford knee score.^[15] Oxford knee scoring is considered to be one of the standard scoring systems to evaluate the functional outcome of knee following TKA.^[15] In our case, the patient had sustained type 2 periprosthetic supracondylar fracture of femur for which fixation was done and bony union was achieved with distal femoral locking plate and screws using MIPO technique.

In conclusion, we believe that good results can be obtained in type 2 periprosthetic fractures after TKA, with locking plate fixation using MIPO technique. It should be considered as one of the effective methods of surgical technique that provides good results with minimal complications. However, the effectiveness of the technique can be confirmed further with studies involving larger population.

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Figure 1: Radiograph (AP and lateral views) of left knee with femur showing periprosthetic type 2 fracture after TKA with displaced fracture fragments and intact femoral component of the prosthesis.



Figure 1

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Figure 2: Immediate post-operative radiograph (AP and lateral views) showing satisfactory reduction and fixation of the fracture with plate and screws using minimally invasive technique.



Figure 2

Figure 3: Clinical figure showing full range of movements (flexion and extension) of the left knee at the end of three months.



Figure 3

Figure 4: Radiograph (AP and lateral views) at the end of six months showing united periprosthetic fracture with the implant (plate and screws) and TKA prosthesis in situ.



Figure 4

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