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A case of total knee replacement in a patient with osteoarthritis of knee joint with malunited distal femur fracture with stiffness

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Abstract

Introduction: Distal Femoral fracture may lead to the development of post-traumatic arthrosis of knee joint because of direct intraarticular injury. Malunion of distal femur fracture, intra-articular osseous defects, limb malalignment and compromised surrounding soft tissues may in turn affect the outcome of total knee arthroplasty (TKA) and makes it a technically demanding surgery. Here we report our experience regarding this complex knee arthroplasty.

Case presentation: We report a case of 72 year old male patient who presented with progressive left knee pain and limited range of motion of left knee joint. Patient had a history of trauma 3 years back which is treated conservatively. Preoperative radiograph indicates severe osteoarthritis of tibiofemoral and patellofemoral joint with multiple osteophytes and malunited distal femur fracture, for which he was treated with primary total knee replacement, which showed good clinical and functional outcome at the end of 6 months.

Conclusion: Total knee arthroplasty in patient with malunited distal femur is technically challenging and can require skills, good preoperative planning, templating and good soft tissue balancing. In patients with malunited distal femur, where optimal limb and implant alignment are achieved, results are much more promising and can compete with the results seen with routine primary knee replacement.

Keywords: Distal femur fracture, trauma, arthrosis, TKA, Malunion

Introduction

Distal femoral fracture is a relatively common orthopedic injury. It can occur with high energy trauma in younger individual, while in the elderly population it often occurs after lower energy falls associated with osteoporosis or any other comorbid conditions. Post-traumatic arthrosis can occur subsequent to fracture of the distal femur with direct intraarticular injury, which leads to residual malalignment. Orthopedic surgeons most frequently encounter patients with prior femoral fractures who have developed end stage osteoarthritis of knee joint and in such cases total knee replacement appears to be the only effective tool ^[1].

Patients with distal femur fracture with intraarticular extension are at a higher risk of developing arthritis early in younger age. In addition, presence of a malunited distal femur fracture leads to disruption of the mechanics of joint function. It may also accelerate the subsequent development of arthritis and create challenges at the time of arthroplasty. With this understanding in our mind, we describe specific complications and technical issues of our experience in this complex total knee arthroplasty.

Case report

A 72-year-old male presented to us with a history of left knee pain since last 2 years. Pain gradually increased in severity with progressive restriction of movement. Patient had a history of trauma 3 years ago, which was treated conservatively. Patient had moderate to severe pain, antalgic gait and restricted flexion- extension movement of left knee. Patient underwent routine examination and x-rays. X-ray of left knee joint showed severe tricompartmental osteoarthritis of left knee joint with malunited distal femur fracture. Preoperative templating on scanogram was done to determine the corrective osteotomy line, amount of bone cut, and the need for expanding stems or augments.

Method

The physician and anesthetic reference was done. Surgery was performed under spinal anesthesia, on simple table. The knee was opened through a standard medial parapatellar arthrotomy with eversion of the patella. Standard implants were used in our case and we faced many uncommon challenges which required different methods to handle it.

Femur shaft was malunited posteriorly, so, base of anterior suprapatellar osteophyte was not removed and little upsizing of femoral component was done. There was callus on medial side, so, femur entry was taken laterally and medial callus was not removed. Synovium was adhered to the under surface of quadriceps tendon, which makes its retraction difficult. So, quadriceps snip incision was taken for better exposure. There were no natural landmarks for femoral rotation except trans-epicondylar axis which is also a gross landmark and so, after distal femur cut, proximal tibia cut was taken and the subsequent femoral cutting block was applied and femoral rotational cut was made according to

proximal tibial cut. Soft tissue balancing was done after bone resection. Patellar tracking was assessed at this stage by the thumbs off sign.

Rehabilitation

Our patient's pre-operative ambulation status was very poor with knee range of motion from 15 to 40 degrees and looking at these figures immediate post-operative results were very good. Patient was fully mobilized on day 1 after surgery. He was advised full weight bearing walking with long knee brace and walker for 2 weeks. Knee flexion range was 0 to 60 degrees in supine position and 0 to 80 degrees in high sitting position and was able to walk with brace for 20 to 25 steps.

After 6 months, patient started to walk comfortably without brace and was able to climb stairs with knee flexion range from 0 to 90 degrees in supine position and from 0 to 100 degrees in high sitting.



Fig 1: Pre-Operative X-Ray showing malunited distal femur fracture with osteoarthritis of knee joint



Fig 2: Post-Operative X- Ray showing well aligned knee with assembly of implants

Discussion

Total knee arthroplasty (TKA) is an extremely successful operation. The long-term success of TKA depends on recreating the mechanical axis, balancing the soft tissues appropriately, and equalizing the flexion and extension gap [2]. All the patients with osteoarthritic knee have some degree of bony deformity and tightness of soft tissues. These deformities can usually be handled by asymmetric intra-articular bony resection and soft-tissue release [3]. Wolff *et al.* reported that the feasibility of joint line

resection and soft-tissue balancing is determined by the degree of the deformity and the distance of the deformity from the knee [1].

As our patient had predisposing distal femur fracture, osteoarthritis of knee in our patient was associated with residual malunion and soft tissue contracture. One of the most common complications associated with post traumatic knee joint arthritis is stiffness and the problems associated with it vary according to the degree and type of stiffness. With our experience, we have realized that the post-

operative flexion range is determined by the pre-operative flexion range. There were many technical intra-operative issues in performing primary TKA in patients with pre-operative stiffness and one of them is exposure of the knee joint. In a patient with severe stiffness it is very difficult to predict the outcome of TKA but this does not necessarily indicate failure. When the mobility is aimed at, it is very important to perform any release surgery to get better exposure of the joint. For exposure, multiple techniques like subquadriceps arthrolysis and osteophyte resection and quadriceps snip incision can be used. In extreme cases, extensive collateral ligament release may be required and tibial tuberosity osteotomy can be performed to protect the patellar tendon. A previous study by Lonner *et al.* studying the outcome of TKA for post-traumatic arthrosis observed that such patients were generally susceptible to a higher rate of complications and an excellent outcome were observed only in 71% of their patients [4]. Another study by Roffi *et al.* also noted poor outcome in 5 out of 13 patients undergoing TKA after a variety of fractures around the knee [5]. These results were inferior to the reported results of routine primary TKA [6]. Papadopoulos *et al.* observed some complication in his study such as patellar tendon detachment, skin necrosis, wound dehiscence and deep wound infection [2]. But, in our patient we did not observed any of these complications. Previous studies have also demonstrated that restoration of axial alignment, and correct component positioning during arthroplasty have a profound effect on knee function [7]. Malalignments are common in post-traumatic arthritic joint which may require osteotomies to restore mechanical axis. Achieving proper axial alignment through intramedullary instrument is difficult on femoral side when extra articular deformity is present and in this situation computer assisted surgeries can be helpful. Closer the deformity to the joint, greater is the impact of the deformity on the orientation of resection. Thus, the further the deformity from the knee joint, the lesser is the need of corrective osteotomy than those that are closer to the knee joint. In vast majority of cases deformities can be managed by intra-articular resection and careful ligamentous balancing [8]. Resection which is greater than 10 mm may jeopardize the origin of the collateral ligaments on the femoral side or affect the strength of the tibial bone stock on the tibial side.

To conclude the discussion, the approach strategy for post traumatic stiff knee needs to take account of cutaneous status of the knee (in previously operated case), reducibility of the deformity and patellar balance. In today's world where numerous methods of internal fixation of distal femur fracture are available, we strongly recommend not to treat it conservatively. It will avoid difficulties associated with TKA in a patient with malunited distal femur fracture.

Conflict of Interest

Not available

Financial Support

Not available

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