Case Report
Hip Knee J. Vol. 5, No. 1, 2024, pp. 39-44
p-ISSN: 2723-7818
e-ISSN: 2723-7826
http://dx.doi.org/10.46355/hipknee.v5i1.140

LATERAL PARAPATELLAR APPROACH WITH PRESERVATION INFRAPATELLAR FAT PAD IN TKA FOR SEVERE VALGUS DEFORMITY WITH FLEXION CONTRACTURE AND PATELLA SUBLUXATION: A CASE REPORT

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ABSTRACT

Total knee arthroplasty (TKA) for osteoarthritic patient with valgus deformity remains a challenge for surgeons, requiring difficult to attain soft tissue balancing. The most commonly used approach for TKA is the medial parapatellar approach. Using the lateral approach enables direct access to the underlying pathology. However, it is broadly burdensome to close the lateral capsule and defect after TKA, especially in the presence of both severe valgus and flexion knee deformity. The use of a laterally based flap is essential in order to close the soft tissue gap left in the lateral aspect of the knee following valgus correction. A case report of secondary osteoarthritis left knee joint with severe valgus deformity, 30 degrees flexion contracture, and patella subluxation in a 25-year-old woman is presented. TKA using lateral parapatellar approach was performed while preserving the infrapatellar fat pad to provide soft tissue covering on the lateral aspect of the knee following valgus correction.

Keywords: Lateral Parapatellar Approach, Infrapatellar Fat Pad Preservation, Total Knee Replacement.

Article History:

Submission : October 2nd, 2021
Revision : December 19th, 2023
Accepted : February 28th, 2024

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INTRODUCTION

Two approaches have been commonly used for performing total knee arthroplasty (TKA) in valgus knee, the medial or lateral parapatellar incisions. Yet, medial parapatellar approach might hinder the surgeon to reach the posterolateral corner to perform release in valgus deformed arthritic knees, especially in moderate (valgus angle >15°, but <30°) and severe (>30°) mostly associated with presence of flexion deformity of the knee joint. In contrast, lateral approach enables better lateral structure visualization and direct lateral release without necessitating any additional step (1,2).

In managing moderate to severe valgus knee deformity, the lateral parapatellar approach has several advantages compared to the medial parapatellar approach: 1) permitting direct release of lateral soft tissue contracture, 2) decreasing subcutaneous undermining for lateral iliotibial tract pie-crusting, 3) allowing better access to posterolateral corner in an internally rotated tibia, 4) enabling better sequential release in accordance to flexion/extension gap balance, 5) facilitating centralization of the deep quadriceps tendon therefore optimizing patellar tracking, 6) preserving more vascularity because the unscathed medial structure, and 7) early post-operative rehabilitation as vastus medialis remains intact (2,3).

In TKA for moderate to severe valgus knee deformity with lateral approach, there might be some arising problems such as prosthetic covering, and joint sealing. Direct suture of the lateral capsular incision may be impossible due to the presence of large capsular defects and ensuing high tension. Several conditions might arise from the increased tension and lack of a soft tissue layer between skin and prosthesis such as formation of larger subcutaneous hematoma, problems in wound healing problems, potential of exposed implant, and even infection. One of the possible methods to resolve this condition is by creating a laterally based flap covering the soft tissue gap formed in the lateral aspect of the knee following correction of the valgus deformity (2,3).

Keblish, Buchel, and Bassaine et.al suggested the use of Hoffa's fat pad flap flipped laterally while preserving the medial pedicle in the patellar tendon to address the distal capsular defect (2). The Hoffa's fat pad or infrapatellar fat pad (IPFP) is a fatty mass placed beneath the patellar ligament, between tibial tubercle and the inferior pole of the patellar (4). There is still a debate lingering upon the function of the fat pad. It is presumed to play some role in the supplying blood via reticulated genicular arteries to the patellar tendon, patella, and anterior cruciate ligament. In addition, it fills the gap inside the knee joint during joint motion and allows.

lubrication of the articular surface by sending synovial fluid. On the contrary, other studies have presented that abnormal IPFP could produce various proinflammatory cytokines such as IL-1β, tumor necrosis factor-α, IL-6, and IL-8, as well as adipokines such as leptin and resistin. Therefore, playing an adverse role

in knee osteoarthritis. Normally the removal of IPFP is conducted to achieve better exposure and to prevent interposition during implantation of the baseplate. Although TKA technology has underwent a significant evolution, which does not require IPFP resection to better surgical access, in around 88% of TKAs partial or total resection of IPFP is still conducted (4).

PRESENTATION OF CASE

A 25-year-old female patient presents with secondary osteoarthritis of the left knee joint with severe valgus, 30° flexion contracture, and lateral patella subluxation (Figure 1.). She had an injury around the knee joint a few years before, which is not treated medically. We performed a total knee arthroplasty for the left knee joint using lateral parapatellar approach with minimal lateral soft tissue releases while preserving infrapatellar fat pad (Figure 2.). Postoperatively, the valgus deformity was already corrected, flexion deformity was diminished, subluxation of the patella was corrected, and no complications related to wound healing.

Figure 1. Clinical picture of the left knee showing severe valgus deformity with flexion contracture and laterally subluxed patella.

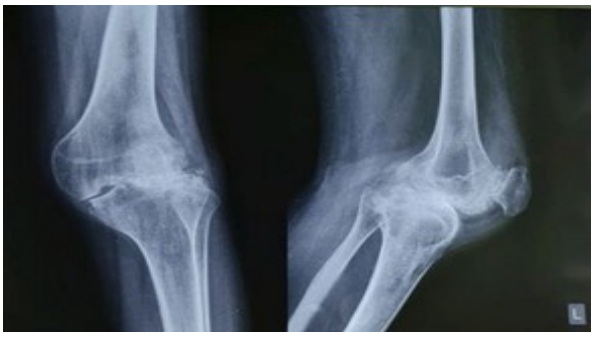

Figure 2. Anteroposterior (AP) and lateral x-ray of the left knee showing osteoarthritis with severe valgus deformity and lateral patella subluxation.

Figure 3. Total knee arthroplasty of the left knee joint

Total knee arthroplasty using lateral parapatellar approach with minimal lateral soft tissue release and preservation of the infrapatellar fat pad (figure 3.).

Figure 4. X-ray of the knee taken after the TKA.

DISCUSSION

An arthritic knee with valgus deformity is often a complex deformity characterized by hypoplasia of the lateral condyle, bone loss affecting the lateral tibial plateau, external rotated tibia, valgus remodeling of femoral and tibial metaphysis, and malalignment of the patella. As total knee arthroplasty is performed in a severe valgus knee, several technical aspects should be carefully cared for such as surgical exposure, distal femur and proximal tibia bone cuts, balance of the medial and lateral ligament, balancing the flexion and extension gap, creation of an appropriate tibiofemoral joint line, the patellofemoral joint balance, peroneal nerve function preservation, and appropriate implant selection regarding constraint (Figure 4.).

Restoring a neutral mechanical axis and achieving ligament balance are important factors for the prosthesis stability and thus longevity, therefore, good functional outcomes (3). Three types of valgus knee classification have been widely used: type-I deformity with minimal valgus and medial soft-tissue stretching, the typical type-II fixed valgus deformity with a more substantial deformity (>10°) and medial soft tissue stretching, and type-III deformity with a severe osseous deformity and medial soft-tissue sleeve incompetency (5).

The commonly used surgical approaches for TKA are the medial or lateral parapatellar approach. In moderate and severe valgus arthritic knee, medial parapatellar approach may lead to more difficulties reaching the posterolateral corner to perform release. Buechel, Fiddian, and Keblish suggested the lateral parapatellar approach (LPA) as it was reported to achieve better clinical outcome to perform a TKA in valgus knee, compared to medial parapatellar approach. Previous literatures have proposed LPA as an alternative to the medial as it allows direct access to release the tight lateral structures, optimizing ligamentous structures while preserving the medial patellar tracking, and preserving medial blood supply to the patella, thereby, reducing the use of constrained implants (3).

A distal femoral cut is useful in reducing the valgus degree of resection from 5-70 to 30 and gain a proper correction of the pre-operative deformity. The level of lateral condyle distal femoral resection can be minimized by about 1-2 mm or absent in a severe valgus knee and femoral resection should be less than 10 mm (6,7). Anteroposterior cut based on anteroposterior and Whiteside line or parallel to proximal tibial cut due to lateral condyle hypoplasia in the severe valgus knee. The proximal tibial cutting must be perpendicular to the tibial long axis. Resection should start from 6-8 mm in the medial compartment and must be presided by removal of the, and in severe case, no bone resection to be performed the lateral

side to avert medial over resection or malalignment cut (1,6,7).

In a knee with valgus deformity, lateral structures which consisted of ITB, PLC, LCL, and lateral head gastrocnemius, retracted. Based on the literature, the best sequence and the best technique in performing releases are still debatable. The release should be performed in knee extension using a lamina spreader to check the tension of the medial and lateral compartments, and then evaluate alignment and stability to achieve symmetric rectangular extension and flexion gaps with the spacer block. The soft tissue release techniques have been described completely as follows (6,7,8).

For the case presentation, secondary osteoarthritis of the knee joint with severe valgus deformity, flexion contracture, and patella subluxation. The valgus knee is characterized by a contracted iliotibial band (ITB), posterolateral capsule, lateral collateral ligament (LCL), and popliteus tendon, as well as osseous deficiency of the posterior lateral femoral condyle and medial collateral ligament (MCL) laxity. Besides soft tissue balancing, a lateral capsular defect usually appears after the TKA procedure through the lateral parapatellar approach which can be a problem because of difficulty with closure related to high tissue tension. In this case, total knee arthroplasty with a lateral parapatellar approach was performed with minimally lateral soft tissue release and preservation of the infrapatellar fat pad. The deformity was corrected through released lateral contracted soft tissues with the following sequences pie-crusting iliotibial tract above the joint line continued by minimally subperiosteal release iliotibial tract insertion from Gerdy tubercle. 30° of knee flexion deformity is also correctable after laterally soft tissue release. A fat pad flap is created by preservation infrapatellar fat pad and flipped laterally to cover the lateral retinacular defect and keep its laxity which is useful for patellar tracking and also realignment subluxation of the patella (10,11).

CONCLUSIONS

The lateral parapatellar approach with preservation infrapatellar fat pad is an effective surgical technique for performing TKA in the setting of secondary osteoarthritis with severe valgus deformity, flexion contracture of the knee, and patellar subluxation.

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