Case Report
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PROXIMAL TIBIAL SLIDING OSTEOTOMY AS AN ALTERNATIVE SOLUTION FOR PATIENTS WITH PROXIMAL TIBIAL BONE DEFECT AFTER NEGLECTED TIBIAL PLATEAU FRACTURES UNDERGOING TOTAL KNEE ARTHROPLASTY: A CASE REPORT

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ABSTRACT

Trauma case to the joints, especially the knee joint is a difficult and challenging case to manage. In the initial conditions of trauma, this case may be relatively more rational to do reduction and fixation. However, in cases of delayed treatment, it will be a challenge for an orthopedic, where in the late condition, the knee joint will degenerate earlier and becomes early osteoarthritis. The therapy that can be done depends on the severity of the joint damage itself. One of the actions that can be taken in severe conditions of osteoarthritis is Total Knee Arthroplasty (TKA). But if the defect is very large, a special additional tool is usually needed, which will also be more expensive. We report a 51 years old female patient with secondary osteoarthritis and severe depressed in the medial proximal tibia due to neglected tibial plateau fracture. The patient had a total knee arthroplasty performed with an oblique osteotomy on the medial side of the tibial plateau and shifting it proximally to cover the defect area. The operation went smoothly and the implant used was a primary Posterior Stabilized (PS) TKA implant without metal augmentation. After the procedure, the patient's knee is reassessed. There was improvement in knee deformity, with good stability and full range of motion of the knee. The purpose of this paper is to demonstrate a sliding osteotomy technique for medial proximal tibia in Total Knee Arthroplasty, with the hope of being an alternative solution and reducing additional costs for osteoarthritis cases with a severe defect in the medial proximal tibia.

Keywords: Arthroplasty, Osteotomy, Knee, Neglected, Tibial Plateau, Osteoarthritis.

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INTRODUCTION

Joint fracture is a difficult and challenging case for orthopedic surgeons. We must do the best possible anatomical reduction and bone fixation to restore the joint surface and restore good joint function so that an early degenerative process does not occur. Tibial plateau fracture is a common injury of the lower extremity (1, 2). Options for the management of these fractures range from conservative methods including bracing and limited weight bearing to surgical management, most commonly open reduction and internal fixation. The decision to pursue surgery is based upon the characteristics of the fracture. In cases that are not treated properly, complications occur including knee stiffness, nonunion, and most relevant to this discussion, posttraumatic osteoarthritis (2).

In developing countries such as Indonesia, especially in rural areas, there are many patients who choose not to undergo surgery immediately. They prefer to do alternative treatment first. Thus, as a result of poor treatment, there is an irregular shape of the surface of the knee joint and it develops into a more severe secondary osteoarthritis. The choice of therapy in this neglected case has also changed to Total Knee Arthroplasty (TKA). TKA is an effective treatment of knee osteoarthritis, restoring function, mobility, and quality of life in the vast majority of patients (3). However, the presence of severe bone defects will be a challenge for surgeons in performing TKA. Especially if we work in a suburban hospital with limited tools and implants.

PATIENT INFORMATION

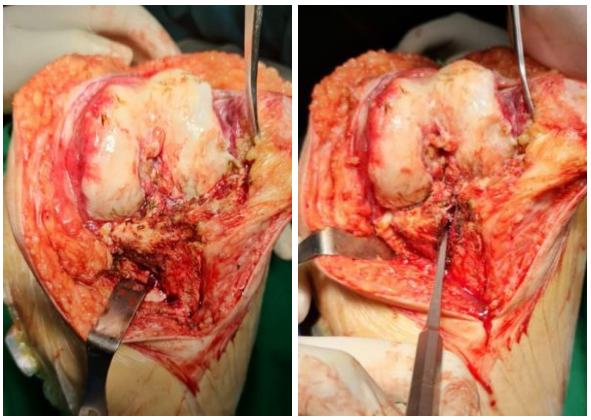
A 51-year-old female came to the hospital complaining of pain in her left knee. Complaints have been getting worse for the last 3 weeks. The patient has a history of motorcycle accidents for 3 months ago, affecting his left knee. However, the patient is afraid to go to the doctor, and prefers to go to a bone setter. Complaints of pain have decreased after that, but for daily mobilization the patient needs a walker. Recently, the patient has been experiencing increasing pain and stiffness in the knee. There was no history of knee swelling, redness, fever, or other signs of infection. On clinical examination, the patient's BMI was 28 kg/m2, mild swelling at the left knee, quadriceps muscle atrophy, varus deformity in knee alignment about 20 degrees, joint line tenderness, knee range of motion (ROM) around 0-100 degrees, and positive varus stress test. Laboratory examinations and other preoperative examinations appeared to be within normal limits and the patient was planned for TKA with unconstrained PS implant and additional sliding osteotomy method on the medial proximal tibia.

(A) (B)

Figure 1. Preoperative anteroposterior (Fig. 1-A) and lateral (Fig. 1-B) radiograph of the left knee. There is a slight defect on the lateral plateau and depression on the medial plateau.

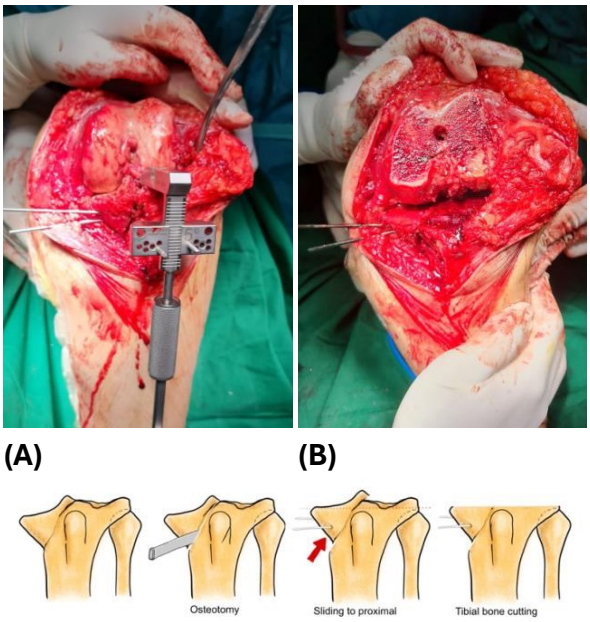
The patient with surgical technique was positioned supine on a regular table, and a standard medial parapatellar approach was performed under spinal anesthesia. Upon entering the knee, there was a defect on the lateral plateau and depression on the medial plateau with fracture lines and hard callus visible. Remove osteophytes, ACL and PCL ligaments.

Identify the old fracture line on the medial plateau and perform osteotomy along the fracture line from the coronal plane. After the osteotomy completed, slide the osteotomy fragment superiorly until its height appears to be parallel to the height of the lateral plateau. Temporary fixation of the fragment with 2 Kirschner wire 2.0, and continued bone cutting on the proximal tibial at the level of the defect from the lateral plateau with a slope of 5 degrees.



(A) **(B)**

Figure 2. Clinical picture of the left knee which shows a depression on the medial plateau (Fig. 2A) and an old fracture line is also seen (green arrow). Performing an osteotomy on the old fracture line (Fig. 2-B)



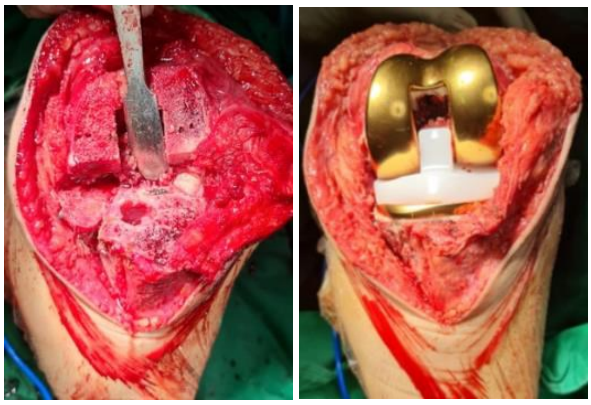
(A) **(B)**

(C)

Figure 3. Preparing proximal tibia cutting after osteotomy, elevation and temporary fixation with Kirschner wire (Fig. 3-A). After proximal tibia and distal femoral cutting (Fig. 3-B). Procedure illustration (Fig. 3-C)

After cutting the tibia, proceed to cutting the femur. The Kirschner wire is maintained during femoral bone cutting. Then measure the tibial base plate and prepare the tibial component. When the tibial trial entered the bone, drill the osteotomy fragment and fixed it with 3 pieces of 3.5 cancellous screws in a divergent position. Install cement implants according to size, tibial size 2.5 (ACS® FB Tibial Component Cemented, Implant Cast, Germany), femoral size 2.5 (ACS® PS Femoral Component Cemented, Implant Cast, Germany), and the tibial insert size is 12.5 mm (ACS® FB PS PE-Insert Hyperflex,

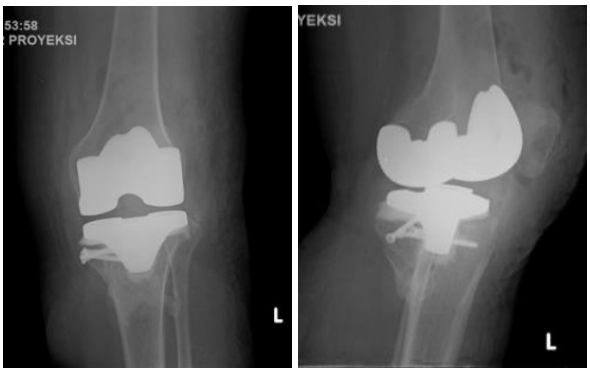
Implant Cast, Germany). Implant placement is done as laterally as possible for both the femoral implant and the tibial implant. Evaluate knee stability in flexion, mid-flexion, extension, and evaluate the osteotomy line. The condition is stable, there is no laxity or joint opening when the knee in 90 degrees flexion, mid-flexion and extension, and there is no movement of fragments from the osteotomy line.



(A) (B)

Figure 4. After preparation and trial of the femur and tibia, screwing the osteotomy site (Fig. 4-A) followed by placing the implant (Fig. 4-B)

After the operation, the patient was treated in the ward and immediately carried out ROM exercise and educated for non-weight bearing mobilization first. Subsequently, the patient was evaluated at the outpatient clinic in the first 10 days for wound evaluation, and at 6 weeks postoperatively to initiate partial weight bearing. The patient is satisfied with the results of the operation because the knee pain has improved, she can move the knee freely without any signs of instability.



(A) (B)

Figure 5. Postoperative anteroposterior (Fig. 5-A) and lateral radiograph (Fig. 5-B)

Figure 6. Clinical pictures of patient mobilization with partial weight bearing after 2 months post-surgery

DISCUSSION

Neglected tibial plateau fracture is a condition that often causes post-traumatic osteoarthritis (1). Epidemiological data showed that 10 years after tibial plateau surgery, 7.3% of the patients had a total knee arthroplasty, especially in the elderly and in severe displacement fractures (4).

Especially with conditions where this fracture is not treated properly. Treatment of neglected tibial plateau fractures depends on the severity of the articular surface damage (5). In severe cases like this case, arthroplasty is a good treatment option (6).

The presence of large defects more than 20% with depressed more than 16 mm, is not possible to treat with screw and bone graft augmentation alone (7), ideally this case would require additional special implants such as metal augmentation and longer stems (2,8). However, it should not be forgotten that in suburban hospitals with limited funding, we must also think about ways to reduce the costs (7). Sliding osteotomy of the proximal tibia may be an uncommon method of dealing with bone loss in primary total knee arthroplasty and may not have been performed elsewhere. Some of the advantages of this method include maintaining the medial bone stock, because it can reduce the risk of cutting the tibia too thick. Elevation of the medial plateau will also reduce tension in the MCL, this technique is a quick and low-tech solution, low cost and can be applied to any type of implant and in any hospital.

The implant position was placed as laterally as possible, due to the previously depressed medial plateau structure and the presence of an osteotomy line on the medial side. This is intended to reduce stress shielding, especially on the medial plateau, where under normal conditions the body weight supported by the medial compartment is 60% of the body weight (9). By placing the implant laterally, it is expected that the body load on the medial side will be transferred more to the lateral side to prevent implant failure (10).

CONCLUSIONS

This report describes a 51-year-old female with neglected tibial plateau fracture who underwent successful total knee arthroplasty using unconstrained PS implant combined with proximal tibial sliding osteotomy as an alternative to deal with severe medial defect of tibial plateau. Although this technique is not a standard in the treatment of defects in the proximal tibia, but with satisfactory surgical results, this technique can be developed and used especially by surgeons from suburban hospitals to reduce costs and solve the limitations of implants in the area. The weakness of this method is that not all forms of medial tibial plateau defects can be applied with this technique, so further studies with larger samples are needed to assess the reliability of this method.

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