



# Polyethylene Post Fracture after Posterior Stabilized Total Knee Arthroplasty

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## Abstract

The post-cam mechanism is important in posterior stabilized total knee arthroplasty. A problem that occurs in the post-cam mechanism can cause instability and knee pain. A patient who underwent primary posterior stabilized total knee arthroplasty and had knee pain that developed two years after the operation without trauma was presented in this case report. The diagnosis was made by arthroscopic examination of the knee joint.

## Introduction

In the posterior stabilized total knee prosthesis, the post-cam mechanism has been developed to provide stability, achieve a high range of motion and prevent posterior subluxation of the prosthesis [1]. The post-cam mechanism contacts at 75° knee flexion and prevent posterior subluxation. Furthermore, stability depends on a well-balanced soft tissue balance. Polyethylene wear is a complication that can contribute to aseptic loosening and osteolysis after total knee arthroplasty [2]. Problems in prosthetic design and poor surgical technique are factors that can cause polyethylene wear [3,4].

## Case Presentation

Primary posterior stabilizing total knee arthroplasty was applied to a 61-year-old female patient three years ago. The patient had non-traumatic knee pain for more than one year during initial outpatient clinic evaluation. The patient did not apply to any center during this period due to the COVID-19 pandemic. The patient had constant pain since operation. The mobilization was not affected during the first-year of the operation. However, knee pain has started to limit the mobilization of the patient after one year and make her bed bound for the last 2 months. On physical examination, there was a 50-degree knee range of motion. She had severe pain during joint movements, but there were no signs of instability. The patient could not locate her pain. The patient had no findings suggestive of infection such as fever, knee rash, warmth, and patellar shock. Laboratory findings for infection were also negative. There was some amount of lysis around the tibial component in the knee radiographs (Figure 1). Three-phase bone scintigraphy was requested, to rule out aseptic loosening. However scintigraphy revealed septic loosening. Knee joint of aspirate was investigated to confirm diagnosis, but it was sterile. Conservative treatment was planned and the patient was followed-up for three weeks periods, however no improvement was observed in pain and joint movements. Therefore, the patient was hospitalized for diagnostic arthroscopy. During the diagnostic arthroscopy, fracture in the post-tibial mechanism and wear in the polyethylene insert structure were observed (Figure 2). It was noticed that the broken post-cam mechanism did not cause instability in the knee, but caused limitation in knee movements due to the compression of the broken piece between the femoral and tibial components. No infective finding was observed in the knee. Bone and soft tissue samples for microbiology and pathology were taken. The broken post-tibial polyethylene piece was removed with a 5 cm medial parapatellar incision. The pain of the patient was resolved, but there were signs of instability after the operation. Microbiologic cultures revealed no infection and pathologic exam was normal. The patient will undergo revision total knee replacement surgery in the following days.

## Discussion

With the development of the cam-post mechanism, which was not included in the first examples of total knee prosthesis designs, posterior stabilizing knee prostheses have emerged [5-7]. Cam on the femoral component is designed to fit over the tibial polyethylene post during knee flexion. This interaction provides a functional replacement for the posterior cruciate ligament and thus results in

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Received Date: 10 Mar 2021

Accepted Date: 30 Mar 2021

Published Date: 02 Apr 2021

### Citation:

Alver MT, Özcan M. Polyethylene Post Fracture after Posterior Stabilized Total Knee Arthroplasty. *Clin Surg*. 2021; 6: 3118.

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Figure 1: Knee anterior-posterior and Lateral radiographs.



Figure 2: Post-tibial polyethylene fracture piece that removed during the operation.

femoral return as flexion increases. Also, it tries to limit the posterior displacement of the tibia relative to the femur [8]. The disadvantages of posterior stabilizing models include post-cam impingement, the potential effects of wear products, fracture in the post-cam mechanism, and greater bone resection [5-7]. In posterior stabilized knee prostheses, inadequate adjustment of femoral and tibial component balance may cause an acute dislocation. Another possible cause of flexion imbalance in a posterior stabilized prosthetic knee is a fracture of the polyethylene post. This may be caused by an acute fracture or fatigue of polyethylene, which is the result of a repetitive collision between the metal femoral component and the polyethylene post [9]. The patient in this report did not show any signs of knee instability, a break in the post-tibial mechanism was not thought in our preliminary diagnoses. Although physical examination and laboratory findings did not support any infection, we thought that the patient might have an infective condition or aseptic loosening, and

we operated the patient for arthroscopic diagnosis. We thought that the compression of broke post-tibial polyethylene between femoral component and tibial insert blocked signs of instability. However, this compression also limited range of motion of the patient.

## Conclusion

In patients with posterior stabilized total knee prosthesis, it should always be kept in mind that there may be a problem caused by the post-cam mechanism among the causes of post-op early and late postoperative mechanical pain and instability. We attributed the fracture in the post-tibial polyethylene mechanism to the poor positioning of the femoral and tibial components in the first operation of the patient, and inadequate soft tissue balance. In patients with post-op knee pain, if the pain cannot be explained by physical examination, laboratory and radiological findings, an arthroscopic intra-articular examination may solve the problem.

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