*British Journal of Medicine & Medical Research*
*3(2): 420-427, 2013*

**SCIENCEDOMAIN** *international*
www.sciencedomain.org

# Catastrophic Wear of Tibial Component of Total Knee Replacement Due to Neglected Dislocation of Polyethylene Insert: A Case Report

**Kasim Kilicarslan[1], Mahmut Nedim Aytekin[1*], Aydan Kilicarslan[2], Ismail Demirkale[1], Hakan Cicek[1] and Nadir Yalcin[1]**

*[1]Department of Orthopaedics and Traumatology, Yıldırım Beyazıt University Ankara Ataturk Training and Research Hospital, Ankara, Turkey*
*[2]Department of Pathology, Yıldırım Beyazıt University Ankara Ataturk Training and Research Hospital, Ankara, Turkey.*

***Authors' contributions***

*This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.*

***Case Report***

***Received 8th November 2012***
***Accepted 22nd December 2012***
***Published 19th February 2013***

## ABSTRACT

We report a case of 69-year-old female patient who presented with a dislocated insert causing tibial component failure and catastrophic metallosis after 4 years of prosthesis implantation. In case of a trauma history, surgeons must suspect friction noise and motion loss as clinical symptoms indicating dislocation of the insert at the initial postoperative period. Timely diagnosis can prevent catastrophic consequences.

*Keywords: Total knee replacement; dislocation; polyethylene insert; metallosis.*

## 1. INTRODUCTION

Although total knee replacement (TKR) technique has yielded excellent results alleviating pain and restoring function with a survival rate of 97.9%, catastrophic complications that even threaten the extremity can be seen in some cases [1]. The most reported complications

**Corresponding author: Email: nedimaytekin@hotmail.com;*

are infection, deep vein thrombosis, pulmonary embolism, neurovascular injury, periprosthetic fracture, stiffness, and osteolysis and wear [2,3,4,5]. However, metallosis is an infrequent complication of TKR. This phenomenon is largely associated with the secondary failure of implanted materials [4,6]. Recent reports on metallosis showed that in the case of the redundant wear or breakage of metal coupled on polyethylene insert by delamination, large amounts of metal ions and particles can be found in blood and urine of patients [4,6,7,8].

We report a case and review of the literature of a failed TKR that resulted due to neglected dislocation of the fixed-bearing insert. This leads to excessive metallosis by direct friction between femoral and tibial components of the knee.

## 2. CASE REPORT

A 69-year-old female patient was referred to our outpatient clinic with a history of pain and loss of motion secondary to minor trauma for ongoing 4 years. The patient was applied a cemented bicompartmental knee prosthesis with fixed bearing insert in some other center. She was misdiagnosed as having regular postoperative pain and stiffness on the postoperative second week. She was prescribed analgesics and recommended physical rehabilitation. In the following period, the patient was unable to bear weight due to loss of motion and pain in the right knee. The clinical complaints of the patient increased with time. He complained of night pain in the left knee and limited motion.

The physical examination revealed the local findings of effusion and erythema as follows: 10º of varus laxity with valgus stress test and 15º extension loss. Throughout the entire range of motion of the patient, metal friction sound and crepitation were noted. The preoperative laboratory evaluation showed normal levels of erythrocyte sedimentation rate, C-reactive protein, and white blood cell count.

On the plain radiographs, there was a loss of posteriomedial tibial component, implant breakage on its lateral edge, loosening particularly in the tibial component, bone defect in the metaphyseal area of the medial tibial plateau, minimal replacement toward the posterior end in the femoral component, and free bone fragments on the posterior and anterior of the femoral component. The insert was seen in the form of a silhouette on the anteriolateral portion of the knee joint (Figs. 1 and 2).

The patient was subjected to revision surgery in the right knee under spinal anesthesia. Polyethylene insert was found under the patellar tendon. The corroded and broken implant parts were removed. The posterior cruciate ligament (PCL) had lost its unity, but the collateral ligaments were intact. In the entire intra-articular soft tissue, particularly in the synovial tissue, marked sludging by excessive metallosis was observed. The pigmented foreign body reaction tissue and wide-spread osseous pigmentation were also found (Figs. 3, 4 and 5). The materials were examined by Department of Pathology.

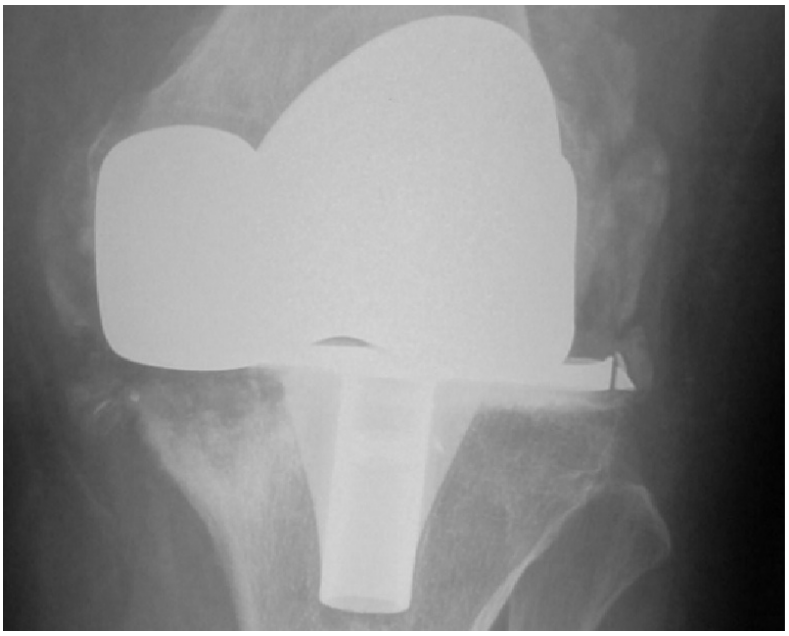

**Fig. 1. Preoperative anterior–posterior view showing radio dense distended capsule, bony defect at the medial plateau and implant breakage at the lateral edge**

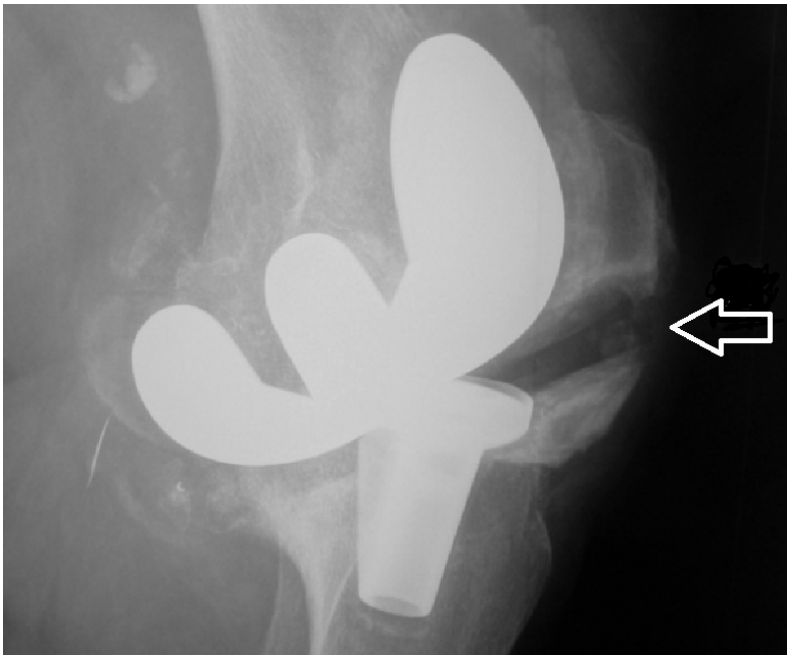

**Fig. 2. Oblique radiograph shows dislocated polyethylene insert lying beneath the patella**

**Fig. 3. The intaroperative appearance of foreign body reaction (sludging) in the osseous tissue**

**Fig. 4. The appearance of defect at the tibial component and an intact polyethylene insert**

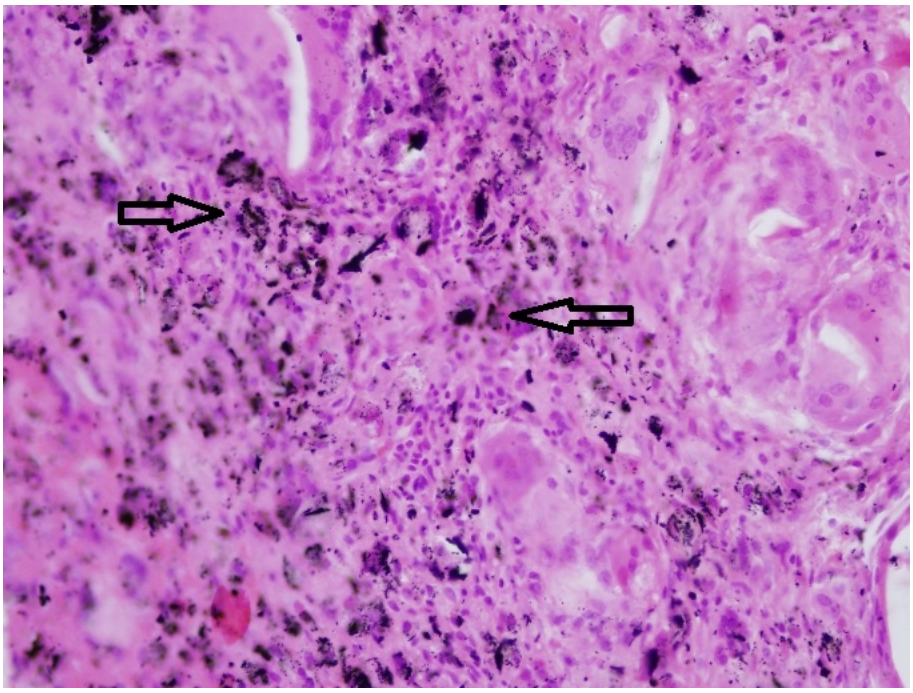

**Fig. 5. High power magnification demonstrates the presence of black metallic debris within multinucleated giant cells in the synovial lining (H&E, 400x magnification)**

The serum chrome and cobalt levels of the patient were measured at the end of the postoperative first month and found to be 1.2 mg/dl (average, 0.7–28 mg/dl) and 2.17 mg/dl (average, 0.8–1 mg/dl), respectively. The chrome level was within the normal limits, while the cobalt level was elevated. The synovium was removed and the pathologic evaluation showed pigmentation and foreign body reactions according to the implant material. The patient had a stable and pain-free knee with 10º of extension loss at her last follow up.

## 3. DISCUSSION

In knee arthroplasty, the use of mobile-bearing polyethylene insert is more common than fixed-bearing inserts [9,10]. The rate of dislocation with fixed-bearing implants have been reported to be 0%–0.5% [9,10]. The rate of reported insert dislocations with fixed bearings in postoperative periods is lower than that with mobile bearings [9,10]. However, the literature reveals no reports of fixed-bearing dislocation in the early postoperative period—as was observed in our patient—and its long-term consequences. The clicking sound and acute locking signs or acute instability may be the clinical symptoms that indicate the presence of a problem with the polyethylene insert intraoperatively. However, insert dislocations may also occur in the late postoperative period. Poulter et al. [11] reported a case of late polyethylene insert dislocation 4 years after knee arthroplasty.

The causes of polyethylene insert dislocation may be listed as component malposition, design of the prosthesis, dysfunction of the extensor mechanism, hamstring spasm, wide posterolateral release, and increased flexion laxicity [12]. Insufficient extensor mechanism has also been reported to be responsible for insert dislocations in knee arthroplasty with

fixed-bearing inserts [12]. Intra-articular laxity of the ligament is thought to be more influential in dislocation than muscle weakness [12]. In their two case reports on fixed-bearing insert dislocation, Davis et al. described the underlying reason as the lifting of the polyethylene insert from the anterior tibial component due to failure in the locking mechanism [10]. This complication was reported to occur particularly in ascending and descending the stairs while weight bearing with the knee in flexion [10].

Hedlundh et al. [13] reported traumatic varus and valgus instability and insert dislocation in one patient after total knee arthroplasty. Recent reports described wearing particularly on the posterior of the insert after TKR with PCL retaining [14].

Insert dislocations are rare occurrences in the early postoperative period and usually observed with mobile-bearing inserts. In the series of 2485 patients who were applied TKR with rotational insert by Thompson et al. [5] 10 dislocations were determined, all occurring within the postoperative 2 years. The authors described the dislocation reasons as advanced age, preoperative valgus deformity, and history of patellectomy [5].

In TKR with fixed-bearing inserts, dislocation can be categorized as dislocations in the early and late postoperative periods. Dislocation of these inserts in the early period may be interpreted as intraoperative failure. Dislocation in the late period was accounted by two etiological factors: (a) extreme friction of the polyethylene insert due to soft tissue and ligament imbalance and (b) osteophytes in the posterior compartment of the knee, added to the posterior compression, by which the insert is forced to dislocate [15].

In the case presented here, the author emphasizes that the neglected fixed-bearing insert dislocation in the early postoperative period results in catastrophic joint and implant failure. Insert dislocations are usually noticed in the early period and can be treated with minor surgery or rarely with the use of revision implants. Nevertheless, the literature does not provide reference material for the clinical pathologies and their treatment methods and outcomes of such neglected cases. Thus, our case may set a good example on this issue.

Prolonged and untreated insert dislocation may result in devastating outcomes. The effect of neglect may lead to implant fractures, marked corrosion and associated foreign body reactions that may involve widespread destruction in the metaphyseal trabecular structure. This pathology requires extensive and aggressive debridement. However, the intra-articular ligaments providing the soft tissue balance destroy the anatomical unity and thus inflict negative effects on the joint biomechanics. This renders the surgical intervention more difficult, and revision implants are needed. The serum chrome and cobalt levels in primary TKR procedures do not significantly differ from those reported in the literature [16].

## 4. CONCLUSION

Although fixed-bearing inserts are believed to offer better insert stability in TKR procedures, potential dislocation risk of such implants should also be kept in mind. Suspected patients should be diagnosed in the early phase based on history, examination findings, and results of advanced diagnostic methods. Timely surgical treatment will prevent catastrophic results and extensive revision surgery.

## CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

## ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Gill GS, Joshi AB, Mills DM. Total condylar knee arthroplasty. 16- to 21-year results. Clin Orthop Relat Res. 1999;367:210-215.
2. Lombardi Jr AV, Mallory TH, Vaughn BK, Krugel R, Honkala TK, Sorscher M, Kolczun M. Dislocation following primary posterior-stabilized total knee arthroplasty. J Arthroplasty. 1993;8:633–639.
3. Rutten SG, Janssen RP. Spontaneous late dislocation of the high flexion tibial insert after Genesis II total knee arthroplasty. A case report. Knee. 2009;16(5):409-411.
4. Tan GM, Lynne G, Sarbjit S. Osteolysis and wear debris after total knee arthroplasty presenting with extra-articular metallosis in the calf. J Arthroplasty. 2008;23(5):775-780.
5. Thompson NW, Wilson DS, Cran GW, Beverland DE, Stiehl JB. Dislocation of the rotating platform after low contact stress total knee arthroplasty. Clin Orthop Relat Res. 2004;425:207-211.
6. Buechel FF Sr. Long-term followup after mobile-bearing total knee replacement. Clin Orthop Relat Res. 2002;404:40-50.
7. Sanchis-Alfonso V. Severe metallosis after unicompartmental knee arthroplasty. Knee Surg Sports Traumatol Arthrosc. 2007;15(4):361-364.
8. Worland RL, Arredondo J, Angles F, Jessup DE. Scintigraphic evaluation in total knee failure secondary to severe metallosis. J Arthroplasty. 1998;13(1):116-119.
9. Insall J, Scott WN, Ranawat CS. The total condylar knee prosthesis. A report of two hundred and twenty cases. J Bone Joint Surg Am. 1979;61:173–180.
10. Davis PF, Bocell JR Jr, Tullos HS. Dissociation of the tibial component in total knee replacements. Clin Orthop Relat Res. 1991;272:199-204.
11. Poulter RJ, Ashworth MJ. A case of dissociation of polyethylene from its metal base plate in a "one piece" compression-moulded AGC tibial component. Knee. 2005;12:243–244.
12. Galinat BJ, Vernace JV, Booth RE Jr, Rothman RH. Dislocation of the posterior stabilized total knee arthroplasty. A report of two cases. J Arthroplasty. 1988;3(4):363-367.
13. Hedlundh U, Andersson M, Enskog L, Gedin P. Traumatic late dislocation of the polyethylene articulating surface in a total knee arthroplasty--a case report. Acta Orthopaedica Scand. 2000;71(5):532–533.

14. Jung KA, Lee SC, Hwang SH, Kim SM. Fractured polyethylene tibial post in a posterior-stabilized knee prosthesis presenting as a floating palpable mass. J Knee Surg. 2009;22(4):374-376.
15. Hasegawa M, Sudo A, Fukuda A, Uchida A. Dislocation of posterior-stabilized mobile-bearing knee prosthesis. A case report. Knee. 2006;13(6):478-482.
16. Luetzner J, Krummenauer F, Lengel AM, Ziegler J, Witzleb WC. Serum metal ion exposure after total knee arthroplasty. Clin Orthop Relat Res. 2007;461:136-142.



*Peer-review history:*
*The peer review history for this paper can be accessed here:*
*http://www.sciencedomain.org/review-history.php?iid=177&id=12&aid=964*