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Neglected Posterior Dislocation Septic Loosening and Prolonged Flexion Contracture of Total Knee Arthroplasty: A Case Report

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Statistical Analysis C
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Manuscript Preparation E
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Patient: Male, 62-year-old
Final Diagnosis: Arthroplasty • knee • posterior dislocation • prolonged flection contracture • septic loosening
Symptoms: Knee joint pain
Medication: —
Clinical Procedure: —
Specialty: Orthopedics and Traumatology

Objective: Patient complains/malpractice

Background: Chronic posterior knee dislocation after total knee arthroplasty (TKA) is a rare but serious complication, especially when it coexists with septic implant loosening, flexion contracture, and extensive comorbidities. Although the severity is comparable to that in the native knee dislocation, there are few reports in the literature. When TKA dislocation is complicated with infection, bone defect, and patient's comorbidity, treatment becomes even more difficult. For these complex complications, in order to provide stable and mobile knees, constrained total knee prostheses are used.

Case Report: We present the case of a 63-year-old, non-ambulatory man, with mental retardation and multiple comorbidities, who had a 9-year history of neglected posterior TKA dislocation, which later became complicated with septic loosening and productive fistula for 4 years.

The patient required use of a wheel-chair for several years, was obese with a body mass index (BMI) of 34.3, and the affected knee was in a prolonged flexion contracture at 90°. The posterior TKA dislocation was later infected by *Staphylococcus hominis* and *Staphylococcus epidermidis*. He was successfully treated with two-stage revision surgery and managed to become ambulatory after 6 years of requiring use of a wheel-chair.

Conclusions: Neglected posterior dislocation of TKA is a rare and potentially limp-causing complication, especially when accompanied with chronic infection, implant loosening, severe bone loss, flexion contracture, and extensive comorbidities. A multidisciplinary approach with careful preoperative planning, exceptional surgical technique, and prolonged supervised physiotherapy are the keystones for a successful outcome.

Keywords: Arthroplasty, Replacement, Knee • Chronic Pain • Knee Dislocation

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/931857

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Background

Total knee arthroplasty (TKA) is one of the most common and constantly increasing surgical procedures in orthopedics worldwide, with a relatively low rate of complications [1,2]. It is estimated that more than 700 000 TKAs are performed each year in the USA alone, and this is predicted to increase to over 3.48 million procedures by 2030 [3]. TKAs of modern design have shown a 25-year survivorship rate of 82.3%; however, despite the satisfactory clinical outcomes, 1 out of 5 TKA patients remain unsatisfied with the outcome [4]. Prosthetic joint infection (PJI) is the most serious complication leading to TKA failure [5], while TKA dislocation is less common, with an incidence of 0.15% to 0.5% in primary TKAs [6-9] and 3.3% in a meta-analysis of revision TKAs [10]. When TKA dislocation is complicated with infection, treatment becomes even more difficult, considering also the potential of a severe vascular injury [11]. To the best of our knowledge, there has been no report published in the literature describing a combination of neglected posterior TKA dislocation associated with septic loosening and flexion contracture throughout the long period of time from dislocation to treatment. This case report aims to increase the awareness of this severe complication, especially when dealing with a chronic flexion contracture in addition to the first-stage of revision, and to emphasize the need for close patient monitoring and supervised physiotherapy to achieve a successful clinical outcome.

The patient and his relatives provided consent for publication of data concerning this case.

Case Report

An institutionalized 63-year-old male patient was referred to our Orthopaedic Department for pain, stiffness, and active drainage from a fistula in his right knee at the site of a previous TKA performed 10 years ago in another hospital. Within the first year after surgery, he sustained a traumatic posterior TKA dislocation that was left untreated and later was complicated with infection, causing him serious ambulatory problems over the last 6 years. The patient required use of a wheel-chair for several years and was mentally retarded, with obesity (BMI 34.3), chronic respiratory failure, and heart failure, and also having a pacemaker and a permanent suprapubic urinary catheter. Upon clinical examination, he had a fixed-flexion deformity at 90° and a productive fistula located at the anterior aspect of his right knee (**Figure 1A, 1B**). No neurovascular deficit was identified. Radiological examination revealed a posterior dislocation of the TKA with loosening and marked osteolysis (**Figure 1C**). He also had an ipsilateral trochanteric fracture that had been operated on elsewhere that had undergone implant removal, leaving a rotational hip deformity and mild arthritis of the right hip (**Figure 1D**). Cultures taken from the fistula and knee aspiration were positive for *Staphylococcus hominis* and *Staphylococcus epidermidis*; the ESR level was 85 mm/h and the CRP 6.3 mg/dl (normal <0.8). No fever or evidence of systematic infection was found. Following a preoperative work-up and optimization for surgery, the patient and his relatives consented for 2-stage revision TKA.

The first-stage procedure was done under regional anesthesia with the patient in the supine position without a tourniquet. The previous surgical scar, the fistula, and the entire synovium were resected en block. After implant removal, a meticulous surgical debridement was performed, leaving large bone defects at F2-b/T1 according to the AORI classification [17] (**Figure 2A**). The medial and lateral gastrocnemius and posterior capsule elevated off the femur and medial hamstrings were released as well. More than 5 tissue samples were sent for culture and biopsy. We used an intramedullary Steinman pin covered with antibiotic-impregnated cement to provide stability [9], as well as 2 cemented cubes to maintain a tibiofemoral joint space open, before implanting the rest of the molded cemented spacer (**Figure 2B, 2C**), extending the knee from 90° flexion to about 30° flexion (**Figure 2D**). At this stage, the 2 cemented cubes helped to keep the tibiofemoral joint space open, which was required due to the muscle contracture, before adding the molded cemented spacer. The wound was closed in layers over 2 suction drains. Intravenous antibiotic treatment (vancomycin-teicoplanin) was administered for 4 weeks, followed by 2 months of oral administration. The patient was non-weight bearing until the second-stage procedure.

The second-stage procedure was performed 3 months later, with normal inflammatory markers, under general anesthesia, with the patient in the supine position without a tourniquet. The cemented spacer was removed, and the Steinman pin was cut off with a high-speed electric burr in 2 pieces and removed as well. A thorough surgical debridement was performed again and new culture samples were taken. No clinical evidence of infection was noted at this stage. A rotating hinge implant revision TKA system was applied (MUTARS® GenuX® MK Revision Knee System, Implantcast GmbH, Germany) with cement and metal augmentation (**Figure 3A**). During the manipulations, the patellar ligament was partially detached from the tibial tuberosity and 2 bone anchors (GII®, DePuy Synthes, Johnson & Johnson, USA) were used for reattachment. However, we regarded tibial tuberosity osteotomy as a possibly useful adjuvant technique to avoid intraoperative partial patellar ligament detachment from the tibial tuberosity. The wound was closed in layers over 2 drains. A brace locked in full extension for 6 weeks was used. Postoperatively, the patient had a prolonged period of intense physiotherapy at a healthcare rehabilitation center.

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Figure 1. (**A**) Clinical preoperative picture of a fixed-flexion knee deformity with posterior tibial sag. (**B**) Clinical preoperative picture of the fistula in the anterior aspect of the proximal tibia. (**C**) Lateral radiograph demonstrating posterior TKA dislocation, implant loosening, and osteolysis especially in the tibia. (**D**) Anteroposterior radiograph of the pelvis showing previous hip surgery from a fracture, rotational deformity, and mild osteoarthritis.

At his last follow-up, 22 months postoperatively, the patient presented a full and pain-free range of knee motion, a leg-length discrepancy of ~3 cm, mainly from the old deformity of the ipsilateral femoral fracture, and had a normal range of knee motion, being able to stand up and walk for the first time after 6 years, using a cane (**Figure 3B-3D**). He was very pleased with the functional outcome, having a Knee Society Score of 85.4 and no signs of infection or loosening.

Discussion

Total knee arthroplasty (TKA) is an acclaimed treatment option to relive pain and provide functional improvement in patients with end-stage degenerative joint disease [3,4]. Although functional improvement is usually rated as good or very good and the 15-year survival rates are estimated to be up to 90%, it can be associated with a large variety of complications, including residual pain, deep joint infection, thromboembolic disease, stiffness, instability, periprosthetic fracture, neurovascular injuries, implant loosening, dislocation, and even death [1,2]. The reported incidence of TKA dislocation in the past has ranged

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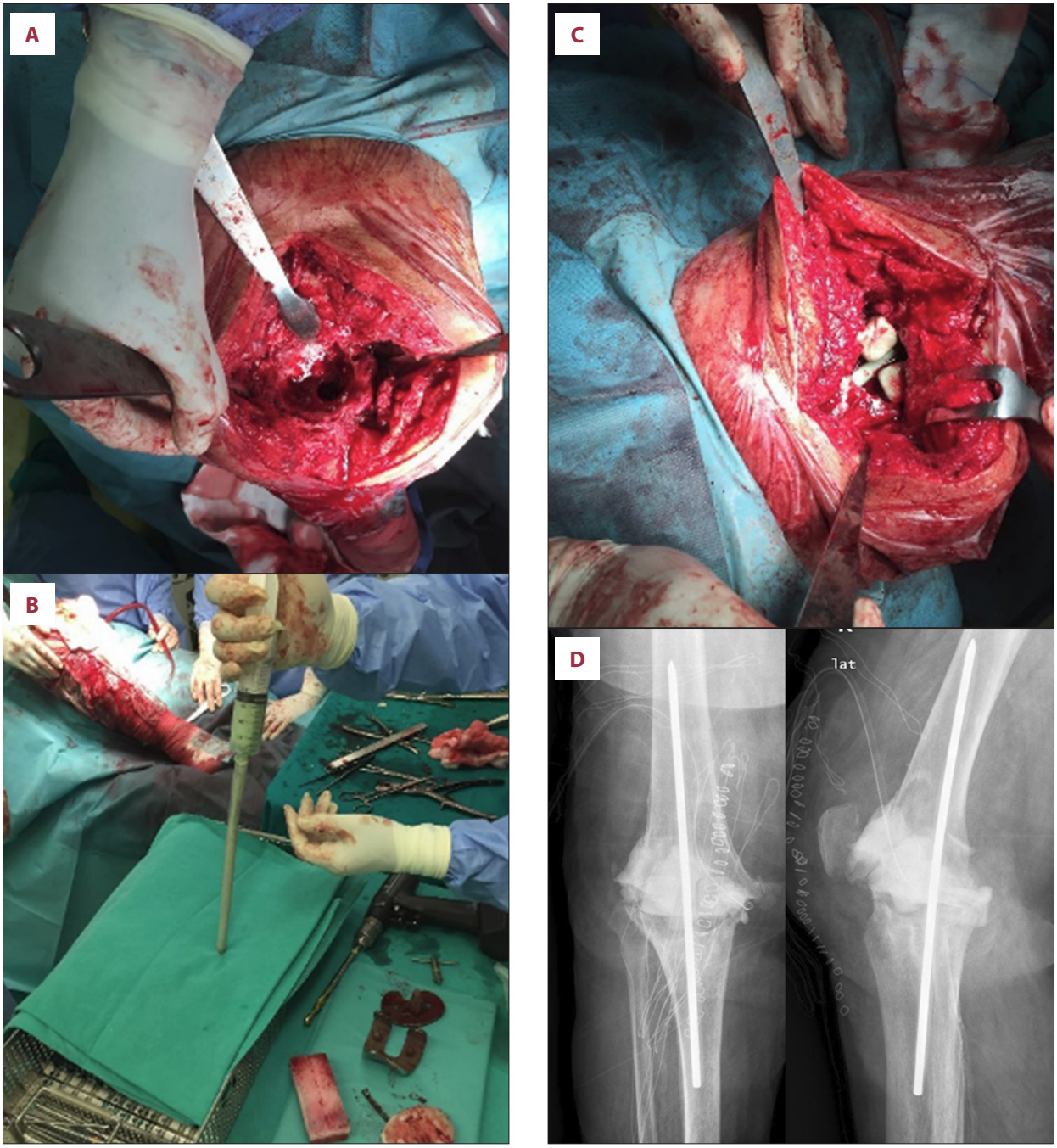

Figure 2. (**A**) Intraoperative photo after implants removal demonstrating marked bone loss especially in the femur. (**B**) Preparation of the intramedullary cemented rod. (**C**) Intraoperative photo after the application of the rod and bone-cemented cubes just prior to the application of the rest static spacer. (**D**) Postoperative anteroposterior and lateral radiographs after first-stage revision, showing good knee alignment.

from 1% to 2% [12]; however, with the evolution of modern surgical techniques and implants, the incidence has fallen to 0.15-0.5% [6-9] for primary TKAs and it is estimated at 3.3% for revision TKAs [10]. Villanueva et al [6] reported on 6 patients with acute TKA dislocation (1 anterior and 5 posterior). The causes of the posterior dislocations included imbalance of the flexion gap, inadequate selection of implants, malrotation of components leading to incompetence of the extensor mechanism, and rupture of the medial collateral ligament. On the final evaluation, results were rated as excellent or good in 4 cases and fair in 1; 1 patient developed deep infection and her knee was arthrodesed, and 2 patients had a minimal

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Figure 3. (**A**) Postoperative anteroposterior and lateral radiographs at 22 months follow-up showing good alignment without evidence of infection or loosening. (**B-D**) Clinical postoperative photos at the last follow-up showing almost normal range of knee motion and ability to stand and walk with the aid of a cane after being non-ambulatory for 6 years.

residual lag for active extension. Rouquette et al [8] recently performed (2018) a systematic review of primary TKA dislocations and found 23 studies with individual data available for analysis in 57 patients. The majority (83.3%) had posterior TKA dislocation, with a mean interval to the index operation of 32.4 months and a low-energy body-height fall as the more common etiology. Obesity (BMI >30) was the most frequent comorbidity and was present in 31 patients (39.2%), followed by severe preoperative deformity (>10° varus/valgus or >20° flexion contracture), neurologic pathology, psychiatric disorder, or decompensated metabolic disease. Contributing factors to dislocation were overall comorbidities in 15 studies (65.2%), followed by intraoperative iatrogenic lesions in 14 studies (60.9%), and implant design in 3 studies (12%), all concerning first-generation posterior-stabilized models. Finally, the rate of deep infection following revision surgery was 10.7%, with 33% of them resulting in knee fusion.

Chronic dislocation of primary TKA, defined as being older than 4 weeks [13], is even more uncommon, and can be further complicated by marked instability, fixed angular deformity, extensor mechanism disruption, severe bone loss, and infection, as in our case. Ross et al [13] reported 3 cases of chronic posterior primary TKA dislocations; 2 of them had BMI >40, all requiring a higher level of constraint to maintain knee stability, and an extensor mechanism allograft was needed in 2 of them. Chu et al [12] reported a posterior TKA dislocation in a 54-year-old woman with septic TKA, which was treated initially with debridement and antibiotic beds; she had the dislocation 11 days after surgery as a result of posterior cruciate ligament tearing due to infection.

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Our case report is of special interest as our patient presented to our center for the first time without any information about his previous management. He had a chronically neglected posterior TKA dislocation associated with chronic inflammation, implant loosening, and flexion contracture. Additionally, the patient had a BMI of 34.3 and mental retardation, both being predisposing factors for TKA dislocation. We were not aware of his previous symptoms and clinical findings, and we had no information on him during the period of time after the primary TKA until he became a resident of the nursing home. At the nursing home, he was using a wheel-chair, an intermittent antibiotic was given, and an amputation above the knee was recommended. To the best of our knowledge, no similar cases with a longer period of time from the dislocation to the treatment have been reported in the literature. Arthrodesis or above-the-knee amputation as alternative options were considered, but most patients treated with amputation in the literature were over age 80 years and only half of them had independent ambulation, while arthrodesis may lead to less patient satisfaction due to potential low back pain and permanent disability [15,16]. Due to severe bone and soft tissue loss at the first-stage revision, an intramedullary rod with antibiotic-impregnated cement, augmented with bone-cemented cubes, was used to provide additional stability to the static spacer [12,14]. There is no consensus about the optimal treatment of chronic knee dislocation flexure contracture. We were aware of a potential neurovascular injury during the knee extension after a long period of time in flexion; therefore, we did not use a tourniquet. Adequate soft tissue release was performed, but not full knee extension, when performing the first-stage procedure (**Figure 2D**) [15]. The second-stage TKA revision was feasible in general but we regarded the extended tibial tuberosity osteotomy as a possibly useful adjuvant technique to avoid intraoperative partial rupture of the extensor mechanism. A minor leg shortening was expected in this case, due to severe bone loss and chronic scarring of the tissues around the prosthesis.

Conclusions

Neglected posterior dislocation of TKA is a rare complication that can cause limping, especially when accompanied with chronic infection, implant loosening, severe bone loss, flexion contracture, and extensive comorbidities. A multidisciplinary approach with careful preoperative planning, exceptional surgical technique, and prolonged supervised physiotherapy are the keystones for a successful outcome.

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Declaration of Figures' Authenticity

All figures submitted have been created by the authors, who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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