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Original Article

Tibiofemoral Dislocation After Total Knee Arthroplasty

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ABSTRACT

Background: Tibiofemoral dislocation after total knee arthroplasty (TKA) is a rare complication. Published case reports describe fewer than 6 patients, making conclusions about the etiology, epidemiology, complications, and treatment of tibiofemoral dislocation difficult. This case series highlights common demographic features, potential causes, and difficulties during the management of tibiofemoral dislocations after TKA.

Methods: Between 2005 and 2014, 14 patients presented to our institution with a tibiofemoral dislocation. Patients were excluded if they had patellofemoral dislocation or subluxation without a tibiofemoral dislocation. We retrospectively reviewed patient demographics, time to first dislocation, number of dislocations, time to surgical intervention, complications, and potential etiologies of tibiofemoral dislocation.

Results: Twelve of 14 patients were female. Their mean body mass index was 33 ± 10 kg/m^2. Thirteen of 14 patients had a mean of 2.0 ± 1.4 dislocations. Four patients dislocated due to polyethylene damage and 5 due to ligamentous incompetence. Twelve of 14 patients required open surgical intervention. Complications in this patient population were common with 3 cases of infection, 7 cases of multiple dislocation, 2 cases of popliteal artery laceration, 1 case receiving a fusion, and 1 case receiving an amputation.

Conclusion: Patients with tibiofemoral dislocation after TKA are predominantly obese, female, and have a high risk for complications. They dislocate predominantly because of polyethylene damage or ligamentous incompetence. Re-dislocation is common if treated with closed reduction alone.

Tibiofemoral dislocation after total knee arthroplasty (TKA) is an uncommon complication. The incidence is 0.5% [1] in a large series of primary TKAs and 3.3% in a meta-analysis of revision TKAs [2]. Tibiofemoral dislocation is defined by the relationship of the tibial component to the femoral component. Although anterior dislocations are described, most dislocations are posterior, with the tibial component translated posteriorly with respect to the femoral component in the sagittal plane (Fig. 1).

Reported causes of dislocation after TKA include malposition of the components, flexion–extension gap mismatch, posterior cruciate ligament rupture in the setting of a cruciate-retaining design, extensor mechanism disruption, a large preoperative valgus deformity requiring an extensive posterolateral release, fracture of the polyethylene insert, and infection [3-21].

There are several small case reports on tibiofemoral dislocations after TKA [3-21]. However, all these case reports have 6 or fewer patients, making conclusions about the etiology of dislocation, epidemiology, complications, and effectiveness of treatment difficult. The purpose of this case series is to highlight the common demographic features of patients with tibiofemoral dislocations after TKA, potential causes of dislocation, and to illustrate the difficulty in managing this patient population.

Methods

Between January 2005 and December 2014, 14 patients presented to our institution (a large tertiary care center) with a tibiofemoral dislocation after TKA (Table 1). Informed consent was obtained from all patients. Patients were not included in this study if they had patellofemoral dislocation or subluxation without a tibiofemoral dislocation or less than 1 year of follow-up. We retrospectively reviewed patient demographics, including age,

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gender, and body mass index (BMI) as well as date of preceding TKA, date of first tibiofemoral dislocation, number of dislocations, date of revision TKA, potential etiology of the dislocation event, and complications. A Knee Society Scores (KSS) was calculated for patients who were alive and available for adequate follow-up. Patients were excluded from KSS analysis if they were permanently braced, fused, amputated, or not alive. Two patients died without documentation of function in their medical records, two patients were braced, 1 was fused, and 1 was amputated, bringing the number of patients eligible for final analysis to 8. Three of these 8 patients were lost to follow-up or declined to participate. Categorical variables are reported as the number and percent, and continuous variables are reported as the mean with standard deviation.

Results

During the studied period, the estimated percentage of all revision TKAs in our practice performed for a tibiofemoral dislocation was 2.1% of all revised TKAs at our institution. Of 14 patients, 12 were women (86%). The mean age of the patients at the time of the first tibiofemoral dislocation was 68 ± 15 years (range, 53-96). The mean BMI at the time of tibiofemoral dislocation was 33 ± 10 kg/m^2. Comorbidities were present with all patients, but most notably 3 patients had diabetes mellitus, 2 patients had rheumatoid arthritis, and 1 had Parkinson's disease. The mean time to failure, defined as the interval between the preceding TKA and the first tibiofemoral dislocation, was 3.8 ± 5.7 years. Notably, 9 of the 14 patients (64%) dislocated their TKA within the first year. The mean time to revision TKA, defined as the interval between the preceding TKA and revision TKA, was 5.1 ± 6.2 years. Review of the operative notes in each case revealed that 4 patients that possibly dislocated as a result of polyethylene damage (29%) and 5 due to insufficient ligament competency (36%, Table 1). Twelve of 14 patients (86%) required open surgical intervention to restore stability, and 11 of 14 (79%) required revision of components. Thirteen of 14 patients (93%) had appropriate data to allow calculation of number of tibiofemoral dislocation events, with the remaining patient having had a history of a chronic posterior tibiofemoral dislocation. Those 13 patients had a mean of 2.0 ± 1.4 dislocations. Complications during the management or revision of tibiofemoral dislocations were common (Table 1), with 3 cases of infection (22%), 7 cases of multiple dislocation events (50%), 2 cases of popliteal artery laceration (14%), 1 case treated with a fusion (7%), and 1 case treated with an amputation (7.1%). The mean KSS in the eligible patients at final follow-up was 50.0 ± 21.2.

Discussion

Tibiofemoral dislocation after TKA is a rare complication. It is challenging to identify an accurate incidence for this problem. Although we are able to calculate the percentage of revision TKAs performed for tibiofemoral dislocation, it is impossible to determine the incidence of tibiofemoral dislocation after primary TKA with the data available in this study since many of the patients had their primary TKAs performed at outside hospitals. However, the percent of revision TKAs performed for tibiofemoral dislocation was 2.1%. This is within the range of 0.5% and 3.3% described by Lombardi et al [1] and Saleh et al [2], respectively.

We hypothesize that there are 2 important causes of dislocation after TKA as evidenced by our case series: polyethylene damage and ligamentous insufficiency. Several authors have found in individual cases that wear of polyethylene wear or ligament rupture lead to tibiofemoral dislocation [4-7,9,12,13,16,18]. Other authors found that their patients dislocated due to rupture or decreased competence of ligaments, sometimes with simultaneous polyethylene wear [6,7,11-13,17,20]. The prevalence of polyethylene damage and ligament insufficiency was 29% and 36%, respectively, in TKAs with a tibiofemoral dislocation. Accordingly, management of a tibiofemoral dislocation depends on appropriate identification of the potential etiology of the instability. In the case of polyethylene wear, revision TKA is indicated, whereas in the case of ligamentous instability, increasing constraint during revision TKA is necessary.

Determining what risk factors might predispose patients to tibiofemoral dislocations after TKA is another challenge. Previous case reports in the literature and data from this case series suggest that obesity, female gender, and neuromuscular comorbidities may increase the risk of dislocation.

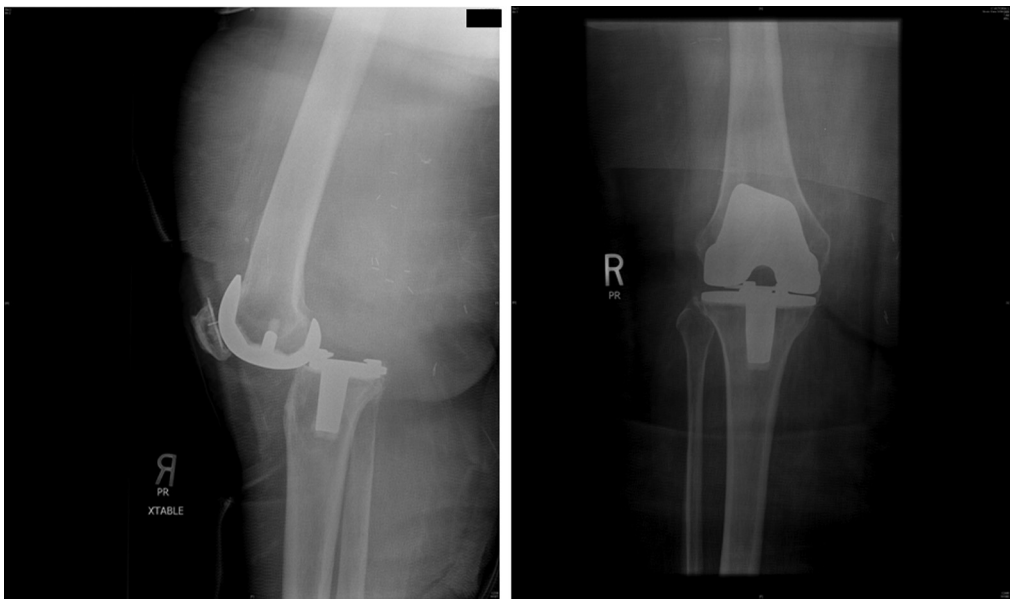

Fig. 1. Lateral and anterior-to-posterior radiograph of the knee demonstrating a posterior tibiofemoral dislocation of a cruciate-retaining total knee arthroplasty after posterior cruciate ligament rupture.