variety of factors including preoperative flexion contracture, preoperative ROM, valgus/varus deformity, surgical technique, type and position of prosthesis. Proximal tibial cut angle and changes in the posterior tibial slope after surgery have also been associated with postoperative ROM in some studies. Based on the results of previous studies using cadavers, computer models, or radiography, we hypothesized that the posterior tibial slope would be correlated with maximal angle of flexion. Although there are some studies that investigated the correlation in TKA patients, other variables were not sufficiently controlled in the study by Kansara and Markel and the follow-up period was short (12 months) in the study by Malviya et al. The purpose of this study was to assess the hypothesis that the posterior tibial slope would be positively correlated with the maximal angle of flexion in a more independent and accurate manner by controlling other ROM-related factors and involving ≥3 years of follow-up.

**Materials and Methods**

1. **Study Subjects and Surgical Technique**

One hundred and two cases (75 patients, 71 females and 4 males), which were available for ≥3 years of follow-up after TKA...
using the Nexgen LPS system (Zimmer, Warsaw, IN, USA), were initially included in this study. The surgery was performed due to degenerative arthritis by the same surgeon at our institution between January 2001 and January 2004.

Of the initial 102 cases, those that had far below/above the mean values for the factors that may influence the maximal angle of flexion except for the posterior tibial slope were excluded to eliminate the confounding variables. The mean preoperative flexion contracture was 11° (range, 0°-60°) in the 102 cases, 9 of which had ≥20° of flexion contracture. The mean preoperative ROM was 114.2° (range, 20°-150°) in the 102 cases, 11 of which had <90° of ROM. The mean preoperative deformity was 11.8° of varus (range, valgus 8°-varus 33°) in the 102 cases, 3 of which had valgus deformities and 6 of which had ≥20° of varus deformity. A total of 23 cases that exhibited far below/above the mean values for at least one of the three factors were excluded from this study. The final number of included cases was 79 (63 patients, 60 females and 3 males). The mean age of the 63 patients was 65.4 years (range, 48-88 years).

A skin incision was made along the midline of the knee and the joint was exposed through a medial parapatellar approach. Soft tissue release was performed depending on the extent of the deformity. The posterior cruciate ligament (PCL) was resected in all cases and a distal femoral cut preceded a proximal tibial cut. Femoral component size was determined with an anterior reference system and a rotation of the component using the transepicondylar axis. The angle of the proximal tibial cut was adjusted to reproduce the preoperative posterior tibial slope while taking care to avoid ≥15° of the slope when measured by our method.

2. Measurement Method

Posterior tibial slope was measured on the lateral radiograph pre- and postoperatively. The preoperative posterior tibial slope was defined as the angle created by a line perpendicular to the anterior tibial cortex and a line parallel to the tibial plateau (Fig. 1). The postoperative posterior tibial slope was defined as the angle created by a line perpendicular to the anterior tibial cortex and a line parallel to the tibial component. The postoperative posterior tibial slope was measured from the radiograph taken immediately after surgery and there was no change in the postoperative slope in all cases during the follow-up period. The pre- and postoperative difference of the posterior tibial slope was calculated by subtracting the preoperative value from the postoperative value.

ROM was measured using a goniometer pre- and post-operatively. The center of the goniometer was placed over the lateral epicondyle of the femur. One of the stationary arms was positioned parallel to the greater trochanter of the femur and the other to the lateral malleolus of the fibula. With the angle in full extension set as 0°, the increases in the angle was measured during knee flexion. The measurement was carried out by 10 experienced orthopedic surgeons, 1 for each year, between 2001 and 2010.

In knees with flexion contracture, the ROM was calculated by subtracting the flexion contracture angle from the maximal angle of flexion. Postoperative ROM was measured at the last follow-up (at ≥3 years after surgery). The change in the maximal angle of flexion was calculated by subtracting the preoperative value from the postoperative value.

3. Comparison

The 79 cases were divided into two subsets: group A (44 cases with ≤10°) and group B (35 cases with >10°) according to the mean postoperative posterior tibial slope, and group α (39 cases with ≤-4°) and group β (40 cases with >-4°) according to the difference of the pre- and postoperative posterior tibial slope.

The postoperative maximal angle of flexion, along with the change in the pre- and postoperative maximal angle of flexion, were measured at the last follow-up (at ≥3 years after surgery). Intergroup comparisons were done between group A and B, and between group α and β.