Influence of intentional femoral component flexion in navigated TKA on gap balance and sagittal anatomy.

Abstract:
Navigation has proven its ability to accurately restore coronal leg axis; however, for a good clinical outcome, other factors such as sagittal anatomy and balanced gaps are at least as important. In a gap-balanced technique, the size of the flexion gap is equalled to that of the extension gap. Flexion of the femoral component has been described as a theoretical possibility to balance flexion and extension gap. Aim of this study was to assess whether intentional femoral component flexion is helpful in balancing TKA gaps and in restoring sagittal anatomy. One hundred and thirty-one patients with TKA were included in this study. Implantation was performed in a navigated, gap-balanced, tibia-first technique. The femoral component flexion needed to equal flexion to extension gap was calculated based upon the navigation data. The sagittal diameter, the anterior and posterior offset were measured pre- and postoperatively based on the lateral radiographs. Medial and lateral gaps in extension and flexion as well as flexion/extension gap differences pre- and postoperatively were analysed. Additionally range of motion (ROM) and patient satisfaction (SF 12) were obtained. To achieve equal flexion and extension gap, the femoral component was flexed in 120 out of 131 patients showing mean flexion of 2.9° (SD 2.2°; navigation data) and 3.1° (SD 2.0°; radiological analysis), respectively. Based on this technique, it was possible to balance the extension gap.
(<2 mm difference) in 130 out of 131 patients (99%) and the flexion gap in 119 out of 131 (91%). The difference between extension and flexion gap was reduced from 39 to 24 out of 131 patients (81%) on the medial side and from 69 to 28 on the lateral side (79%). The sagittal diameter was restored in 114 out of 131 cases (87%); however, anterior offset was significantly reduced by 1.3 mm (SD 3.9°), and posterior offset was significantly increased by 1.6 mm (SD 3.3°). No correlation between any navigation and radiological parameter was found with ROM and SF 12. The navigation-based, gap-balanced technique allows intentional flexion of the femoral component in order to balance gaps in more than 90% of primary TKA cases. Simultaneously, the sagittal diameter is restored in 87% of patients. However, to achieve equal gaps, the posterior offset is significantly increased by 1.6 mm and the femoral component is flexed by 3°. To evaluate the effect of this technique on the clinical outcome, future studies are needed.