

Regional Differences Between The United States, Scandinavia, And South Korea In Patient Selection And Early To Mid-Term Clinical Outcomes In Patients Undergoing Primary Total Knee Arthroplasty

Orthopaedics / Knee & Lower Leg / Joint Replacement - Primary

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Background

Total knee arthroplasty (TKA) is a reliable procedure to treat patients with osteoarthritis (OA), pain, and physical disability. Differences may exist in preoperative characteristics and postoperative clinical outcomes of TKA patients between international regions. Research on regional differences in TKA would be helpful for clinicians interpreting outcomes of studies from different regions.

Objectives

The aim of this prospective multicenter cohort study was to investigate differences in patient selection factors as well as pre- and post-operative patient reported outcome measures (PROMs) between centers in the United States, Scandinavia, and South Korea for patients undergoing primary TKA.

Study Design & Methods

A total of 398 patients received TKA in 3 regions: 169 in Scandinavia (3 centers), 129 in the USA (3 centers), and 100 patients in South Korea (2 centers). Patient demographics, x-rays, and the Knee Injury and Osteoarthritis Outcome Score (KOOS) were collected preoperatively. Preoperative OA was graded from standing anterior-posterior and lateral x-rays using the Kellgren-Lawrence (KL) system. Postoperatively, the KOOS and a 21-point numerical rating scale for satisfaction were collected (0=very satisfied).

To assess regional differences in patient selection, Chi-squared tests were performed for categorical variables. For continuous variables, Kruskal-Wallis tests were used.

Regional differences in PROMs were assessed at preoperative, 1-, 3-, and 5-year follow-up intervals using a piecewise linear mixed-effects model with a spline at 1 year to account for rapid improvement directly after surgery. The Bayesian information criterion was used to determine the fixed effects in the model. The observations were clustered by patient, which was entered as a random effect.

Results

There were significant differences in age, KL grade, and body mass index (BMI) between the 3 regions ($p < 0.05$). South Korean patients were the oldest, while patients from the USA had the highest BMI. Patients from Scandinavia had a significantly lower KL grade than those from the USA or South Korea ($p = 0.001$).

For all 3 KOOS subscales analyzed (pain, symptoms, function in daily living), the mean predicted preoperative value did not vary significantly between regions. As expected, these values improved greatly at the 1-year visit. However, the improvement was significantly lower for the Scandinavian patients ($p < 0.001$), though from 1 to 5 years, they improved at a faster rate for each subscale ($p < 0.001$). This gradually reduced the difference between Scandinavia and the two other regions, although a significant difference remained at the 5-year visit (mean difference: 3.2–5.4; $p = 0.041$).

Patients from all regions were highly satisfied. However, Scandinavian patients were marginally but statistically significantly less satisfied throughout the 5-year observation period (odds ratio = 0.8; $p = 0.032$).

Conclusions

Significant differences were observed in patient selection (BMI, age, KL grade) for patients undergoing TKA between the 3 regions. The lower KL grade of patients in the 3 Scandinavian centers suggests that TKAs in this region may be performed earlier in OA disease progression.

For PROMs, no significant differences were found preoperatively, indicating that patients' subjective perception of their pain and activity before surgery was similar across regions. However, significant differences did exist in the improvement of PROMs after surgery, even when controlling for age, sex and KL grade. Future studies should focus on understanding the factors that contribute to regional differences in subjective improvement.