Cutting Costs, Not Outcomes: A Comparative Study of a Global Knee System in TKA

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INTRODUCTION: Total knee arthroplasty (TKA) is highly effective for advanced knee osteoarthritis, with implant selection influencing outcomes, recovery, and cost-efficiency. Traditional implants have demonstrated strong clinical results, but interest is growing in cost-effective alternatives such as the Cost-Effective Knee System (CEKS) (World Knee by Signature Orthopeaedics), which was designed for use in lower-income countries to expand global access to arthroplasty. This study compared perioperative outcomes and patient-reported outcome measures (PROMs) between CEKS and a traditional implant (SIGMA Knee System, DePuy Synthes), with the hypothesis that CEKS provides comparable outcomes at lower cost.

METHODS: A retrospective chart review was conducted of consecutive patients who underwent primary TKA by a single fellowship-trained arthroplasty surgeon at one facility between September 2021 and the present. The electronic medical record identified 97 CEKS and 169 traditional implant cases; after excluding CEKS cases with incomplete perioperative data, 47 remained. Propensity score matching at a 1:1 ratio based on age, sex, and BMI yielded two balanced cohorts (47 CEKS vs. 47 traditional implant). Demographic and clinical variables, including preoperative opioid use, were collected. Perioperative outcomes included hospital length of stay (LOS), inpatient opioid consumption recorded as morphine milligram equivalents (MMEs), pain scores at 2 hours postoperatively and at discharge, and 30- and 90-day readmission rates. PROMs (KOOS, JR.) were recorded preoperatively and at 3, 6, and 12 months. Continuous variables were analyzed with Student's t-tests, and categorical variables with chi-square or Fisher's exact tests, with significance set at $p<.05$.

RESULTS: Ninety-four patients (26 females, 21 males per cohort) were included, with mean age 75.3 ± 6.0 years and BMI 27.3 ± 3.4. Pre-op opioid use was higher in the traditional implant group (n=17) vs. CEKS (n=8). LOS was similar (1.33 vs. 1.1 days, p=.087). Total MME use was lower in the CEKS group (22 ± 30) vs. traditional implant (34 ± 22, p=.032). Pain scores at 2 hours (3.3 vs. 3.9, p=0.267) and discharge (3.0 vs. 3.5, p=0.314) were not significantly different. No 30- or 90-day readmissions occurred in either cohort. PROMs were similar at all time points: pre-op (traditional 50.7 vs. CEKS 52.7, p=.428), 3 months (70.1 vs. 70.4, p=.919), 6 months (74.0 vs. 74.3, p=.921), and 12 months (80.6 vs. 83.1, p=.666). Follow-up surgeries outside the 90-day window included 5 traditional implant cases (synovitis, PJI, peroneal nerve compression, arthrofibrosis/effusion) and 2 CEKS cases (arthrofibrosis/effusion, ankylosis).

DISCUSSION: The CEKS, designed for resource-limited healthcare settings, demonstrated comparable outcomes to the traditional implant across perioperative metrics and PROMs. Both groups had similar LOS, pain management, and readmission rates. The significantly lower MME use in the CEKS group suggests a potential opioid-sparing advantage. PROMs improved similarly in both cohorts through one year. Postoperative reoperations were observed in both groups but were not implant-specific failures.

SIGNIFICANCE/CLINICAL RELEVANCE: Originally tailored for lower-income countries, the cost-effective knee system provides perioperative and patient-reported outcomes comparable to a traditional implant, with possible benefits in opioid reduction. CEKS may represent a viable TKA option that balances clinical performance with cost containment, supporting broader global access to joint replacement.

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