

Clinical Performance and Radiographic Observations of Single vs. Multiple Radius Femoral Components in Primary Total Knee Arthroplasty

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INTRODUCTION:

Both single-radius (SR) and multi-radius (MR) femoral components have been utilized in total knee arthroplasty (TKA), with each design offering theoretical advantages. However, studies conflict whether one design leads to superior clinical performance. Our study is one of the largest cohorts of either component and aims to compare their clinical efficacy in range of motion, mechanical complications, and radiographic changes.

METHODS:

An institutional surgical database was reviewed for patients who underwent primary TKA under from 2011 to 2018. Changes in flexion contracture (FC), range of motion (ROM), and subsequent mechanical complications. Anteroposterior (AP) and lateral radiographic images were evaluated at 6 weeks postoperatively and at most recent follow up to determine radiolucent line (RLL) progression. ANOVA, t-tests, chi-squared, and Fisher's exact tests for proportions through SPSS.

RESULTS:

In total, 213 SR and 1,913 MR femoral components were included from six companies. ASA score distribution, mean age, BMI, and proportion of varus/valgus tibiofemoral alignment did not differ between cohorts. Mean follow up was 2.2 ± 2 years for SR and 3.1 ± 2.4 years for MR. Preoperative FC and ROM between each component type, and postoperative FC and ROM between each component type did not differ ($p = 0.67$; 0.12, 0.46, 0.61). Neither SR nor MR had greater likelihood of aseptic loosening (0.5% vs. 0.6%, two-tailed, $p = 1$). SR was associated with increased frequency of tibial radiolucency progression on AP images (29% vs. 23.3%, $p=0.03$), and decreased frequency of radiolucency progression on femoral lateral images (22.3% vs. 14%, $p=0.003$).

DISCUSSION AND CONCLUSION:

MR and SR femoral components may be functionally and clinically non-inferior to one another, and both show similar progressions of RLLs.