Dual Mobility Total Hip Arthroplasty: Effect of Femoral Head Size and Surgical Approach

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Disclosures:

Introduction: Dual mobility total hip arthroplasty (DM-THA) allows for very large femoral head size, which may be beneficial for hip range of motion (ROM) and improved stability(1). No clinical study has objectively compared ROM in patients with DM-THA and large (36-mm head) total hip arthroplasty (36-THA). The aim of this prospective case-control study is to test the hypotheses that DM-THA provides superior hip ROM compared to 36-THA by dynamic radiography, and that surgical approach (posterolateral [PL] versus modified anterolateral [AL]) has effect on post-operative hip ROM.

Methods: Sixteen patients (11 males, 5 females) who had undergone DM-THA with a minimum follow up of one year were age, sex and body mass index (BMI) matched to twenty patients (12 males, 8 females) with 36-THA, all operated upon by the senior author. Maximum hip-trunk flexion, extension and total hip-trunk ROM was calculated on standing lateral digital radiographs of the lower lumbar spine, pelvis and hip, using commercially available software (TraumaCad®, BrainLab, Munich, Germany) from three upright positions; standing neutral, standing with maximum hip flexion and standing with maximum hip extension. Contributions to motion from lumbo-sacral spine (LSS) and pelvic tilt were calculated and subtracted from hip-trunk measurements to quantify true hip flexion, extension and total true hip ROM. Statistical analysis (SPSS software, Chicago, IL) was performed on all radiographic measurements to detect difference in ROM between DM-THA and 36-THA, and to detect difference in ROM between THAs performed through posterolateral (THA-PL) and anterolateral (THA-AL) approaches.

Results: There was no significant difference in age, sex and BMI between groups (p>0.05). In DM-THA versus 36-THA, hip-trunk flexion (118°±15.3° vs. 112.75°±16.44°), hip-trunk extension (20.88°±6.72° vs. 21.00°±6.00°) and total hip-trunk ROM (139.50°±17.86° vs. 133.75°±16.29°) revealed no statistically significant difference between groups (p>0.05). Similarly, true hip flexion (100.63°±14.77° vs. 99.85°±13.55°), extension (12.75±6.01° vs. 12.20±3.71°) and total true hip ROM (113.38°±19.28° vs. 112.05°±14.84°) did not show statistically significant difference between groups (p>0.05). No significant difference in true hip flexion or extension existed between THA-PL and THA-AL (p>0.05). There was no significant difference in total hip-trunk and total true hip ROM between males and females (p>0.05). Patients with degenerative/stiff LSS (LSS ROM <15°) exhibited significant reduction in hip-trunk total ROM (130.62°±15.97°) compared to patients with flexible (ROM >15°) LSS (144.27°±15.56°) (p=0.015), without any significant reduction in true total hip ROM (112.81°±16.59° vs. 112.40°±17.46, respectively) (p=0.943).

Discussion: To the current authors’ knowledge, this is the first study to report on the in-vivo, clinical, active ROM after DM-THA. Both study and control groups were well matched demographically. Objective radiographic, rather than clinical measurements of ROM were performed. Limitations include small number of patients in each group and non-randomization. No radiographic measurements performed on the contralateral, non-operated hip which could have served as an internal control. However, our in-vivo ROM data agree with computer simulations and in-vitro studies(2).

Significance: DM-THA does not provide superior ROM compared to 36-THA as evidenced by dynamic radiography. PL/AL surgical approach, with presumptive violation of hip extensors/flexors, does not affect post-operative hip extension/flexion, respectively. THA patients with flexible LSS may exhibit apparent increased hip ROM due to compensatory movement at the LSS, rather than an actual increase in true hip ROM.

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