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CONTACT SURFACE PATHWAYS IN TOTAL HIP REPLACEMENT PATIENTS STRATFIED BY GENDER

David Lunn[(1)], Graham Chapman[(2)], Anthony Redmond[(2)]

[(1)]Leeds Teaching Hospital NHS Trust, United Kingdom
d.lunn@leeds.ac.uk

[(2)]University of Leeds, United Kingdom
G.J.Chapman@leeds.ac.uk, A.Redmond@leeds.ac.uk

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Summary: Introduction
Total hip replacement (THR) patients usually have good clinical outcomes postoperatively but remain slightly compromised functionally[(1)]. Patterns of failure with the ASR hip highlighted the potential importance of patient-specific characteristics in wear of hip implants(2). The aim of this study was to better understand the effect of patient-specific characteristics such as gender on hip motions and to explore the possible impact on wear.
Methods
137 THR patients, at least 12 months post-surgery, underwent 3D kinematic (Vicon, Oxford, UK) and kinetic (AMTI, USA) analysis whilst walking at self-selected walking speed. 3D kinematic data were then mapped onto a modelled femoral cup at 20 pre-determined points to create pathways for femoral head contact, which were then quantified by deriving the aspect ratio. Comparisons were made using independent t-tests and 95% confidence intervals(CI).
Results
Patients were grouped by gender, 70 female (age 71.6±7.6 years, BMI 27.8±4.3) 67 male patients (age 71.0±7.9 years, BMI 28.6±3.5). Neither group demonstrated full hip extension with the female group exhibiting a mean minimum flexion angle of 1.9° (CI 0.0 to 3.76) and the male group of 0.2° (CI -1.5 to 1.9) ($p=0.197$). The female group also exhibited an increased mean abduction angle of 0.8° (CI 0.1 to 1.6) ($p<0.001$) and internal rotation angle of -5.5° (CI -7.0 to -4.0) ($p=0.013$) compared to -2.0° (-2.8 to -1.2) and -8.4° (CI -10.1 to -6.7) respectively in the male group. The female patients had a greater mean aspect ratio of 3.56 (CI 3.40 to 3.71) ($p=0.003$) compared to the male group mean of 3.21 (CI 3.05 to 3.37).
Discussion
There were systematic differences between male and female patients, particularly in the frontal and transverse plane kinematics, and these kinematic differences between the groups were reflected in the aspect ratios. The increased aspect ratio in the female patients might assist long molecule entrainment and hence reduce risk of polyethylene wear for equivalent levels of activity and contact force.
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References
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[2]Langton et al J Bone Joint Surg [Br] 2010;92-B:38-46.