

Title: Effect of Liner Geometry on Jumping Distance When It Comes to Total Hip Arthroplasty: As Relevant as Femoral Head Size

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Abstract

Dislocation is one of the most common complications after total hip arthroplasty (THA). Jumping distance (JD) is a key indicator of joint stability. Therefore, we aimed to investigate the differences in JD values among various liner models

JD values were calculated using a mathematical model for 25 modular polyethylene liners used in 6 uncemented cup designs from 4 major manufacturers based on previously published articulating head coverage data. For each liner model, the average values corresponding to each femoral head size within each cup size were used in the analysis.

On average, enlarging the femoral head size from 28 mm to 36 mm resulted in a 3.53 mm increase in JD within the safe zone (5–25° anteversion and 30–50° inclination). The JD variation between different liner designs was of the same magnitude as the effect of increasing the femoral head size from 28 mm to 36 mm: 3.16 mm with 32 mm and 3.32 mm with 36 mm femoral heads. The JD of the liner with lowest coverage combined with a 36 mm femoral head was lower than that of the liner providing the greatest coverage, even when coupled with a 28 mm femoral head.

Our results show that liner design can influence JD to a degree comparable to increasing femoral head size from 28 mm to 36 mm. Optimal joint stability cannot be ensured solely by selecting a larger head: liner geometry should be carefully considered alongside head size in THA component selection.

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