



UMEÅ UNIVERSITET

# Radiological Measurements in Total Hip Arthroplasty

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**Abstract**

Every year, about 20000 patients in Sweden undergo total hip arthroplasty (THA), a successful, safe and cost-effective procedure to regain mobility and restore hip joint function in patients suffering from severe hip joint disease or trauma. The radiographic preoperative planning and postoperative evaluation of these parameters require good validity and reliability. This thesis included 4 prospective cohort studies on the radiological measurements in THA.

**Study I:** Included 90 patients with primary unilateral OA treated with THA. Global femoral offset (FO) using a standard method compared to a new method (the Sundsvall method), leg length discrepancy (LLD), acetabular cup inclination and anteversion were measured on postoperative radiographs. The interobserver reliability and intraobserver reproducibility were tested using three independent observers. **Study II:** Included 172 patients with unilateral primary OA treated with THA. LLD and global FO were measured on postoperative radiographs. Patients with lengthening of the operated leg  $\geq 10$ mm (n=41) and patients with reduction of global FO  $> 5$ mm (n=58) were further studied to investigate the amount of lengthening and global FO reduction that took place in the stem and in the cup compared with the contralateral side to investigate whether the leg lengthening and FO reduction were related to the stem or cup. **Study III:** Evaluated the function with (WOMAC) index and QoL with EQ-5D. At 1-year after THA, the same scores and also hip abductor muscle strength were measured postoperatively. We investigated whether the preoperative radiological osteoarthritis (OA) grade and symptom duration influenced the 1-year outcome parameters. **Study IV:** Included 213 patients. Body mass index (BMI) was documented preoperatively. We evaluated the effect of BMI and other factors on postoperative radiological FO restoration, LLD, acetabular cup anteversion and cup inclination.

**The main conclusions were:** **1.**The radiographic measurement methods of LLD, global FO, cup inclination and anteversion as well as the Sundsvall method have the required validity and reliability to be used in clinical practice. **2.**Lengthening of the operated leg is mainly caused by improper femoral stem positioning while global FO reduction results from improper positioning of both acetabular and femoral components. **3.**The preoperative radiological OA grade and symptom duration had no influence on the outcome of THA. **4.**Increased BMI showed a negative effect on restoration of post-THA leg length but not on restoration of FO or positioning of the acetabular cup.

**Keywords :** Total hip arthroplasty; leg length discrepancy; femoral offset; WOMAC; EQ-5D; quality of life; radiographic measurements; duration; acetabular cup; inclination; anteversion; BMI.

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