

ABSTRACT

We investigated the relationship between the initial contact status and stress shielding in total hip arthroplasty (THA) using fit-and-fill type straight-stem implants. In addition we evaluated the clinical and radiographic outcomes. Subjects were 100 hips of 94 patients who underwent THA and were followed-up for ≥ 10 years. Contact areas with the femoral cortical bone were investigated according to the zonal distribution of Gruen using postoperative CT images. Depending on the number of contact areas, the patients were classified into high contact [HC], medium contact [MC], and low contact [LC] groups. Radiographic and clinical outcomes were evaluated. In the HC group (20 hips), severe stress shielding was observed in 12 hips, which was statistically significant ($p = 0.008$). In the LC group (29 hips), mild stress shielding was observed in 27 hips which was statistically significant ($p < 0.001$). No significant differences were observed among the three groups in clinical outcomes, Harris hip score ($p = 0.719$) or Japanese Orthopedic Association (JOA) score ($p = 0.301$). In insertion of cementless collared fit-and-fill type straight-stem implants, severe late stress shielding of the femoral bone may occur if high contact of the femoral component is achieved. However, the degree of stress shielding does not result in adverse clinical outcomes.

Keywords: Fit-and-fill, Stress shielding, Cementless straight stem, Total hip arthroplasty