

**Ruixue Zhang**

**Abstract Title: RADIOGRAPHIC ASSESSMENT OF TWO SHORT FEMORAL STEMS USED DURING TOTAL HIP ARTHROPLASTY VIA DIRECT ANTERIOR APPROACH**

**Objective**

The use of short femoral stems in total hip arthroplasty (THA) has been increasing due to the popularity of less invasive surgical procedures. Compared to the longer, standard stem, short stems preserve more bone and facilitate insertion thru a direct anterior approach (DAA). However, different short stems can lead to various outcomes including malalignment and peri-operative complications. Therefore, the purpose of this study was to compare component placement accuracy and peri-operative complications between two short femoral stem designs.

**Methods**

This study retrospectively evaluated 189 patients (212 hips) having received the Fitmore (Fitmore® Hip Stem, Zimmer Biomet, Warsaw, IN) and 177 patients (211 hips) having received the Tribute (Ovation Tribute® Hip Stem, Ortho Development, Draper, UT) short femoral stems. All arthroplasties were performed via the DAA. Radiographic assessment included pre-operative and six-week post-operative weight bearing anteroposterior bilateral hip radiographs to determine hip offset (HO), leg length difference (LLD), subsidence and femoral component angle (FCA). Standard, previously reported measurement techniques were performed, with a HO and LLD greater than 6mm considered clinical significant. Additionally, a measured FCA beyond  $-3^\circ$ , indicating a more medially angled stem, was classified as varus malalignment. Intraoperative and early post-operative fractures were collected as well. Parametric statistical tests were performed to evaluate differences between implant groups. A univariate logistic regression was used to determine individual outcomes based on stem implant and were presented as odds ratios (OR) and 95% confidence intervals (CI).

**Results**

No significant group differences were present in patient demographics or pre-operative alignment. Post-operatively, the Tribute group had significantly higher HO ( $4.43 \pm 3.2$ ) compared to the Fitmore group ( $3.64 \pm 3.6$ ) ( $p=0.002$ ) but there was no significant difference in LLD ( $p=0.136$ ) or subsidence ( $p=0.445$ ). Patients in the Tribute group were more likely to have a  $HO > 6\text{mm}$  (OR: 2.176, CI: 1.323-3.578;  $p=0.002$ ) but were less likely to have a varus FCA (OR: 0.328; CI: 0.209-0.515;  $p < 0.001$ ). A total of four fractures occurred, including one post-operative fracture (0.5%) in the Fitmore group and one intraoperative (0.5%) and two post-operative fractures (0.9%) in the Tribute group ( $p=0.509$ ). Stem design did not increase the risk for overall fracture ( $p=0.337$ ).

**Conclusions**

Although the incidence of fracture were similar between the two implants, there were differences in the post-operative radiographic assessment. The more accurate HO in the Fitmore group was likely due to the number of implant variations available to the surgeon, allowing for

more precise establishment of symmetrical HOs. However, the curved design of the Fitmore was more likely to result in varus malalignment (39.3% vs 17.7%). While this may seem like large clinical difference, the absence of early fracture may suggest that post-operative malalignment, within reason, may not increase the risk of fracture, making either of these implant designs appropriate during direct anterior THA.

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