Intraoperative Periprosthetic Fracture Rate in Elderly Patients Undergoing Hip Hemiarthroplasty: A Comparison of Uncemented and Cemented Stems

Michael DeRogatis[1], Robert Gomez, Margaret Judith Higgins, Paul S Issack, Douglas W Lundy[2]
[1]orthopaedic surgery, St Luke's University Hospital, [2]St. Luke's University Health Network

INTRODUCTION:
There is controversy over whether hemiarthroplasty for displaced geriatric femoral neck fractures should be performed with or without cement. While both techniques have equivalent outcomes in terms of pain relief and revision rates, uncemented implants have been shown to have a higher rate of periprosthetic femur fractures (PFFs). However, many studies comparing cemented and uncemented implants have used a tapered-wedge stem design, which may create a wood-splitter effect in osteoporotic bone. A fit-and-fill stem design may be safer to implant in terms of fracture risk in this population. The purpose of this study was to determine the PFF rate of three hemiarthroplasty designs used for geriatric hip fractures: cemented, uncemented fit-and-fill, and uncemented tapered-wedge.
METHODS:
This was a multicenter, retrospective study involving 718 patients with a displaced femoral neck fracture who underwent treatment with either uncemented or cemented hemiarthroplasty between 2014 and 2022. Inclusion criteria included patients aged ≥70 years treated with a fit-and-fill stem, tapered wedge stem, or a cemented stem. Those undergoing total hip arthroplasty, revision procedures, and/or presenting with an acetabular fracture were excluded. Analysis of variance and chi-squared tests were employed, with statistical significance set at $p < 0.05$. The primary outcome was incidence of intraoperative PFF. Across cohorts, no differences were observed in age, body mass index, American Society of Anesthesiology score, length of stay, 30-day mortality, or laterality.
RESULTS:
Among the 718 patients, 59 intraoperative PFF were identified. Patients treated with a tapered wedge stem had a significantly higher incidence of intraoperative PFF compared to those treated with fit-and-fill stems (9.7% vs. 5.0%, $p = 0.038$). No significant differences were found when comparing fit-and-fill with cemented stems (5.0% vs. 9.8%) or tapered wedge with cemented stems (9.7% vs 9.8%). Patients treated with a tapered wedge stem were found to have two times greater odds of experiencing an intraoperative PFF compared to those treated with a fit-and-fill stem (OR = 2.05, 95% CI 1.03-4.09).
DISCUSSION AND CONCLUSION: These findings demonstrate an association between implant design and intraoperative PFF rates during hip hemiarthroplasty in geriatric patients. In this study, uncemented fit-and-fill stems were associated with a lower incidence of intraoperative PFFs than tapered-wedge designs but not cemented stems.