Hypothesis

Comparable Functional and Radiological Outcomes of Cemented and Uncemented Hemiarthroplasty in Elderly Intracapsular Femoral Neck Fractures: A Hypothesis for Patient-Specific Implant Selection

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Abstract

Background: Elderly patients with intracapsular femoral neck fractures face high morbidity and mortality. Partial hip replacement (PHR) is the standard of care, but the optimal choice between cemented and uncemented implants remains controversial.

Hypothesis: Both cemented and uncemented PHR yield comparable functional and radiological outcomes at 12 months, provided implants are selected based on bone quality and patient factors.

Clinical Importance: Demonstrating equivalence would encourage individualized, evidence-based selection of implant type, reduce unnecessary risks and support best practices in geriatric fracture care.

Future Research Direction: Prospective, randomized, multicentre trials are needed to validate these findings across diverse patient populations and assess long-term outcomes, cost-effectiveness, and patient satisfaction.

Keywords: Femoral neck fracture, Hemiarthroplasty, Elderly, Cemented, Uncemented, Functional outcome, Implant selection.

Background

Fragility fractures of the proximal femur are a growing burden in aging societies, causing significant morbidity, functional decline, and healthcare costs [1, 2]. Intracapsular femoral neck fractures constitute nearly half of all hip fractures in the elderly, with displaced fractures prevalent among postmenopausal women with osteoporosis [1, 3]. Due to poor healing potential and high risk of avascular necrosis, surgical intervention—most commonly partial hip replacement (hemiarthroplasty)—is preferred to restore mobility and reduce immobilization complications [4, 5].

Debate persists over implant fixation method. Cemented stems offer initial stability and lower periprosthetic fracture rates, but risk cement implantation syndrome [6, 7]. Uncemented stems may reduce operative time but can have higher rates of subsidence and thigh pain, especially in osteoporotic bone [6, 8, 9]. Indian studies directly comparing these approaches remain limited, particularly in prospective settings [6, 14, 20].

Hypothesis

We hypothesize that both cemented and uncemented partial hip replacements provide equivalent functional and radiological outcomes at 12 months, provided that:

- Cemented stems are used for patients with poor bone quality

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(Dorr Type C).
• Uncemented stems are reserved for patients with good bone stock (Dorr Type A/B) [6, 9, 11].
A patient-specific approach—rather than routine use of one implant type—is optimal for this population.

Supporting Evidence:
• In a prospective cohort of 194 elderly patients, both cemented and uncemented groups showed significant improvement in Harris Hip Score, SF-36, and VAS, with no statistical difference at any follow-up point [6, 9, 11, 16].
• Radiological assessment showed all stems stable, with limb length discrepancy and migration comparable between groups [4, 14, 25].
• Complication rates (infection, DVT, dislocation, death) did not differ significantly by implant type [9, 11, 19].

Contrary Evidence:
• Some meta-analyses suggest cemented stems provide better early pain relief or lower revision rates, but these advantages diminish with careful patient selection [11, 17, 19].
• Uncemented stems may underperform in patients with poor bone quality or significant comorbidities [8, 9, 11, 17].

Discussion
The equivalence of cemented and uncemented hemiarthroplasty in selected elderly patients challenges the traditional preference for one approach. Recent meta-analyses and large registry studies indicate no significant differences in medium-term functional and radiological outcomes when patient selection is individualized [6, 9, 11, 17, 19, 22, 25].
This approach allows surgeons to minimize risks associated with cement (e.g., cardiopulmonary events) in suitable candidates while maintaining excellent implant stability and function. In osteoporotic patients, cemented fixation remains advantageous. Our study found no excess in perioperative complications, death, or implant migration in either group, provided selection criteria were applied [9, 11, 12, 14, 20].
Clinical importance: This strategy promotes faster recovery, cost-effectiveness, and aligns with global trends towards tailored orthopaedic care [6, 8, 10, 14, 20].

Clinical Importance
Adopting a patient-specific implant selection strategy may:
• Reduce surgical risk by minimizing unnecessary cement use [9, 11, 12].
• Optimize outcomes in both high- and low-risk patients [9, 16, 17, 19].
• Facilitate early mobilization, reduce complications, and improve quality of life [6, 8, 14, 25].
• Encourage evidence-based practice in resource-limited settings [20, 22, 25].

Future Research Directions
Future work should:
• Test this hypothesis in large, multicentre, randomized controlled trials with longer-term follow-up [8, 10, 19, 20].
• Evaluate cost-effectiveness, patient-reported satisfaction, and rare complications [17, 19, 20].
• Explore the role of enhanced rehabilitation and home safety modifications in maximizing outcomes across implant types [20, 22, 25].

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