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In Which Patients Should Cemented Femoral Components Be Used During Primary Total Hip Arthroplasty?

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In which patients dshould cemented femoral components be used during primary total hip arthroplasty?

Response/Recommendation: The literature supports the use of a cemented femoral component in women older than 70 years of age, in patients who have femoral neck fractures, in patients who have a Dorr type C femur, and in patients who have severe osteoporosis.

Level of Evidence: Moderate.

Expert Vote: 84.9% Agree, 11.4% Disagree, 3.7% Abstain.

Rationale

A large number of studies from multiple countries have been published on the topic of cemented femoral fixation during total hip arthroplasty, including large database and registry studies, retrospective reviews, meta-analyses, and some randomized controlled trials. Given the multitude of factors influencing the decision-making for using cemented femoral components, each factor has been separately considered when reviewing the literature.

The most studied factors in the literature are age and sex, which consequently have the clearest evidence for cemented femoral fixation. Studies have found that cemented femoral fixation results in significantly decreased intraoperative periprosthetic fractures, postoperative periprosthetic fractures, and revisions in elderly women [1–9]. Studies consistently demonstrate that women appear to be an independent risk factor for periprosthetic fracture [3,10,11]. Compared to women, the risk reduction effects of cemented femoral components on periprosthetic fracture rates and revision rates appear to be less significant for men [1,2,6]. However, there are studies that demonstrate a reduction in periprosthetic fractures and revisions in all elderly patients regardless of sex

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[1,12–20]. For patients aged less than 50 to 55 years, cementation does not appear to provide protection against periprosthetic fractures or revisions and might increase the risk of aseptic loosening and revisions [14,21,22]. It should also be noted that the definition of "elderly" varies significantly between studies, with common cutoffs between 65 and 75 years. Given the lack of consensus for age cutoff, considerations should be given for cementing the femoral stem in patients aged more than 75 years and perhaps aged more than 65 years in the presence of poor bone stock [9]. However, the benefits of reduced periprosthetic fractures need to be weighed against the potentially increased risk of aseptic loosening, pulmonary embolism, and infection [2,13,18,23,24].

In the challenging setting of hip arthroplasty in young patients who have hip dysplasia, some studies have demonstrated that cementless stems exhibited a higher ratio of intraoperative fracture and thinning of cortical bone, including stress shielding, medullary changes, stem alignment changes, and osteolysis, compared to cemented stems; furthermore, there appears to be no significant difference in survival at mean follow-up of 4 to 10 years [25–29]. This is not to say that cementless stems should not be used in these patients, but in the setting of challenging torsional deformities, cemented stems may be a reasonable alternative to diaphyseal-engaging stems to help correct these difficult deformities.

The literature overwhelmingly supports the use of cemented femoral components in elderly patients undergoing total hip arthroplasty for the treatment of a low-energy femoral neck fracture. Studies have shown that cementation of the femoral component in this setting significantly decreases the rates of periprosthetic fractures, complications, and revision rates and significantly increases patient-reported outcome measurements such as the Harris Hip Scores [30–37]. Notably, there were two randomized controlled trials evaluating cement usage in this population; early discontinuation of both trials was due to preliminary results demonstrating significantly increased complication rates (periprosthetic fractures, revisions, and dislocations) in the uncemented group [33,36].

Regarding patients who have radiographic osteoporosis or Dorr type C femoral anatomy, studies have shown an increased periprosthetic fracture rate [38,39] and cemented femoral fixation in these patients is correlated with better patient-reported outcomes and lower revision rates [10,40,41]. However, there is some disagreement in the literature, with one large database study showing similar rates of periprosthetic fractures and revisions in osteoporotic patients who have cemented versus cementless femoral components [42]. Overall, high-quality studies regarding cement usage for Dorr C/osteoporotic patients are lacking, which is likely in part due to patient selection bias given the general consensus of using cemented femoral components in these patients.

CRediT authorship contribution statement

Zhaorui Wang: Writing – original draft, Methodology, Investigation, Data curation. **Abdelhak Adjel:** Writing – review & editing. **Federico Burgo:** Writing – review & editing. **Muhammad Amin Chinoy:** Writing – review & editing. **Dirk J.F. Moojen:** Writing – review & editing. **Kenichi Oe:** Writing – review & editing. **Michael Reed:** Writing – review & editing. **Marco Teloken:** Writing – review & editing. **Michael M. Kheir:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation.

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