

Letter to the Editor: Cemented or Uncemented Hemiarthroplasty for Femoral Neck Fracture? Data from the Norwegian Hip Fracture Register

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To the Editor,

We have read with great interest the study by Kristensen and colleagues [7] on cemented and uncemented hemiprostheses in patients with hip fractures.

In their study, the authors characterized the effects of cemented and uncemented hemiprostheses. In the uncemented group, the authors found lower mortality at the day of surgery

through 7 days after surgery, but a higher risk of reoperation due to periprosthetic fractures and loosening. Results at 1-year follow-up showed similar mortality in both groups. The authors recommended that older patients undergoing hemiarthroplasty be treated with cemented implants rather than uncemented ones.

We want to add some information on the scientific history of hip prostheses anchored with bone cement and comment on the results in Kristensen and colleagues [7].

Since methyl metacrylate (MMA) was introduced into human hip prosthetic surgery, there have been reports of hemodynamic instability and fatalities after impact of cement and prosthesis in the femoral shaft, but not following uncemented procedures [3, 8]. Numerous cellular, animal, and human investigations have been conducted to show how these complications develop [6, 8, 13, 18]. Sometimes referred to as bone cement implantation syndrome or microembolism syndrome, the associated acute cardiorespiratory and vascular dysfunction are believed to be caused by mechanical and chemical effects of MMA monomer that impact procoagulant intravascular cellular activities induced by bone marrow destruction [12]. Debris from surgically damaged bone marrow, as well as the effect of cement and prosthesis in the femoral shaft,

trigger coagulation, cell destruction, and blood-cell aggregation (microemboli including fat), which can injure the pulmonary vasculature. Activated blood cells interact with the endothelium and entrap and impact gas exchange, as well as vascular stability [4, 5]. Activated blood cells reach the arterial circulation and may accumulate in distant locations, damaging organs like the brain, heart, and kidneys [14, 15]. MMA may exert neurotoxic effects on lipophilic cells like nerve cells, and add pro-coagulant stimulation through toxic cell destruction and depressant effects on the cardiorespiratory and vascular system [4]. Depending on the severity of the pathophysiological process, the fragility of the patient, the skill of the anaesthetist, and the quality of intensive-care treatment, the patient may die immediately in the theatre, die weeks later, or survive with or without sequela [3, 16].

This condition is rare, and so intervention-driven clinical trials are impossible to perform; even historically controlled comparative studies are difficult, because the infrequency of the event makes it hard to compare risk factors relevant to the condition. We also speculate that it may be underreported. However, large national databases have given us populations to perform reliable statistical analyses [16].

The authors certify that neither they, nor any members of their immediate families have any commercial associations that might pose conflict of interest in connection with the submitted article.

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Letter to the Editor

In a recent register study of more than 11,000 patients with hip fracture, we found use of cement, comorbidity and ASA-score to be independently associated with an increased risk of death on the day of surgery and the following day. When ASA increased from 1 or 2 to 3 or 4, the number needed to harm (to cause one death from cementation) rose from one of 811 patients to one of 33 operated patients [16]. About 60% of these early fatalities were directly attributed to bone cement [11]. Recent studies [1, 2, 9] that have performed day-by-day estimates have also found early increased mortality related to cementation while studies based on reported discharge mortality and 1-year mortality have not found any difference between cemented and uncemented groups. During the post-operative time course, other conditions like dementia could develop, potentially leading to death [15].

Thus, adequate statistical power and feasible methods is essential to reveal group differences of such infrequent fatal instances. Stratified assessments on follow-up after surgery and on the frailty of patients are still needed. Observed outcomes after surgery can be affected by competing risk on both morbidity and mortality.

Kristensen and colleagues [7] found a higher rate of peri-prosthetic fractures in patients with uncemented hemiprostheses, which also has been reported by other investigators [10, 17]. In our view, peri-prosthetic fractures are generally caused by either inexperienced surgeons or inadequate surgical technique. Generally, young registrars on duty are handling the patients with fractures while senior surgeons handle the patients who elect to undergo hip replacement. To minimize uncemented peri-operative femoral shaft fractures, surgeons should identify the patient's improved

medical condition, have a suitable selection of the implant based on radiology and templates, and leave the operation to experienced or senior surgeons. Thus, the key to avoiding cement-related deaths during or soon after hemiarthroplasty surgery for hip fracture is for the surgeon to choose an uncemented implant.

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