



Viewpoint

The Paradox of the Decline of Cemented Femoral Stems

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The use of cemented stems in total hip arthroplasty (THA) has been declining for several years. However, these implants do not seem to have disappointed either surgeons or patients. Thus, herein lies the paradox of an implant that provides the expected result and yet is in the process of being abandoned.

In the absence of large-scale, long-term randomized prospective series, national registers provide valid elements of comparison. Troelsen et al. in 2013 analyzed 7 national registries (Australia, Canada, England, Denmark, New Zealand, Norway, and Sweden) showing a steady increase in the use of uncemented prostheses in these countries until 2010 [1]. The recent update of this study in 2019 highlighted a “cementless” trend between 2010 and 2020 that had increased in some countries but seemed to be reversing in others (England and Wales, Australia, New Zealand, and Finland) [2]. The authors agree in these 2 analyses that survival was significantly better for cemented prostheses in people older than 70–75 years, in all registers. For the other age groups, survival was better for cemented prostheses, or equivalent, except in the Australian

register. This type of global analysis can also be done through a meta-analysis. Phedy et al. [3], in a meta-analysis including 27 studies, showed very similar results in terms of survival, with equivalence in the youngest and superiority of cemented fixation in the oldest.

The question of young subjects remains highly controversial. Here again, the registers make it possible to provide elements of comparison. The Nordic Arthroplasty Register Association (NARA) [4], which collected data on 29,558 hips in patients younger than 55 years, did not find any difference in the overall revision rate. However, this equivalence was the result of a balance between revisions for aseptic loosening, with a favorable rate for uncemented implants (Risk ratio [RR] = 0.5, confidence interval [CI]: 0.5–0.6), counterbalanced by other causes of revisions, particularly fractures (RR = 2.6).

The occurrence of a periprosthetic fracture is a known complication of THA. The risk of periprosthetic fracture depends on the type of implant used and the postoperative term. The meta-analysis of Bissias et al. [5], with data on 599,551 THAs, showed that the use of a cemented stem reduced the relative risk of periprosthetic fracture to 0.41 (95% CI: 0.19–0.62). Lindberg-Larsen et al. [6], in an analysis of 7169 THAs, observed a relative risk of fracture of 4.1 (95% CI: 2.3–7.2) for uncemented stems. The risk of fracture is present postoperatively (RR = 1.8 at 2 years), but it also persists over time [4]. However, not all cemented stems are created equal. The National Health Service registry (United Kingdom) [7] showed a variable risk of fracture among 257,202 cemented stems: RR of 1 for an Exeter-type stem, 0.88 for the C-stem (Depuy Synthes, Raynham, MA), and 0.41 for Charnley-type stems. To our knowledge, there is no study stratifying cementless stem types and fracture risk. This should be done according to the classification suggested by Khanuja et al. [8]. Similarly, there is no information on the impact of bone quality, cortical thickness, and patient characteristics other than age on the choice of cemented or uncemented stems. This should be evaluated in future studies.

The risk of periprosthetic fractures when using a cemented stem is higher when the prosthesis is placed for a femoral neck fracture, RR of 5.1 in the Norwegian registry [9]. In this indication, mortality is the primary endpoint. The postoperative term seems to determine the outcome. The Norwegian registry highlights very

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early excess mortality for cemented stems (RR = 0.7, 95% CI: 0.5–0.9, $P < .001$ on postoperative day 7) [9]. This difference is then reduced over time due to higher rates of complications, notably fractures, and revisions for uncemented stems (RR = 1.5, 95% CI: 1.4–1.7, $P < .001$). There is no longer a difference after 1 year. Bone cement implantation syndromes are rare and occur in operations in elderly subjects (average age of 85 years) and remind us of the importance of respecting precautions and contraindications. Also, Veldman et al. [10], in a meta-analysis of 5 randomized controlled trials and 950 patients, observed no difference in mortality at 1 month, 1 year, and 5 years and more complications for uncemented recent stems (odds ratio: 1.61) but also the benefit of a shorter operating time by 9.96 minutes. The risk of intraoperative or postoperative periprosthetic fractures was at least 3 times higher for uncemented stems. No significant differences were found in cardiovascular complications, including bone cement implantation syndromes.

Bone cement implantation syndromes and stem loosening could be 2 arguments against cemented stems. Regarding bone cement implantation syndromes, according to Costa et al., there is no increase in perioperative mortality in cemented stems compared to uncemented stems [11]. Although some studies disagree on this point and find an increase in perioperative mortality with cemented stems, this is quickly counterbalanced after a week by an increase in postoperative mortality in uncemented stems, which seems to be consequent to more frequent periprosthetic fractures [12]. In the case of aseptic loosening, the longevity of cemented stems is not inferior to that of uncemented stems, and revision can be performed by the cement-in-cement technique in selected cases [13,14]. This is not the case for septic loosening, which requires an extensive trochanteric osteotomy to remove the cement, which is a strong disadvantage of the cemented stems.

These unanimous data led the American Academy of Orthopedic Surgery to recommend the placement of cemented prostheses in neck fractures [15]. This clinical benefit is associated with an economic benefit. Blythe et al. [16], in an Australian study, calculated that changing current practices for cervical hip fractures from a widespread use of uncemented to cemented-stem arthroplasties would save the Australian health-care system \$2.0 million over 5 years with a gain of 203 years of life for the patients. The U.S. Medicare system reported equivalent results, where cemented and uncemented stems had similar clinical outcomes, but with lower implant costs, shorter lengths of stay, and lower readmission and revision rates in favor of cemented stems [17].

What are the causes of this paradox? Two arguments are sometimes put forward: the gradual loss of cemented stem implantation experience in training centers and a slightly longer operating time. However, we should remember that the difference in operating time is only about 10 minutes. Other factors are probably involved, perhaps predominantly, such as the “trend effect” and the appeal of novelty or even the marketing actions of manufacturers. We must remain aware of these debates and enlighten them with robust practical studies, otherwise health-care policies, public and private, will be driven by coercive measures, and a lack of discernment is to be expected. To avoid this, it seems crucial to study why surgeons do not base their practices on evidence-based recommendations [18]. A better understanding of this phenomenon would help improve surgeon training on this topic and prevent this type of situation.

Conflicts of interest

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