

Cement use in bipolar hemiarthroplasty and its association with cancer risk

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INTRODUCTION:

Bipolar hemiarthroplasty (HA) has emerged as a widely employed and effective surgical procedure for hip fractures, involving the replacement of the femoral head with a prosthetic implant while preserving the natural acetabulum in elderly patients. Previous studies have been unable to confirm a direct relationship between polymethylmethacrylate (PMMA) use and cancer risk in HA due to a lack of differentiation between cemented and cementless fixation in cancer risk assessment. This study aims to clarify this by examining the incidence of cancer in patients who underwent cemented HA compared to those who received cementless HA.

METHODS: This study was a national cohort analysis using the Korean National Health Insurance Service (NHIS) database, which represents nearly the entire South Korean population. We included adult patients aged over 19 years who underwent HA between January 1, 2003, and December 31, 2019 (N = 160,394). Patients with previous revision surgeries, bilateral procedures, or prior cancer history were excluded. Cemented and cementless groups were defined based on the type of femoral stem used. The primary outcome was the incidence of cancer, measured through cancer-specific insurance codes and cancer diagnosis codes. Kaplan-Meier curves and Cox proportional hazards models were used to evaluate cancer risk differences between cemented and cementless HA groups.

RESULTS:

Among the patients, 37.6% underwent HA with cemented fixation. During a follow-up period of up to 12 years, no significant differences were observed between the cemented and cementless groups in the risk of developing any cancer, solid tumors, or hematologic cancers. However, the cemented group had a 1.8-fold (95% confidence interval [CI], 1.12–2.99) increased risk of multiple myeloma compared to the cementless group. This association was particularly pronounced among patients under 70 years of age (adjusted hazard ratio [aHR], 3.44; 95% CI, 1.10–10.82) relative to those aged 70 or older.

DISCUSSION AND CONCLUSION:

In this nationwide cohort study of HA, the overall cancer risk did not differ between the cemented and cementless groups, except for multiple myeloma. The cemented group had a higher risk of multiple myeloma than the cementless group. The association between cement use and risk of MM development was stronger in younger patients.

Although prior studies suggested an increased cancer risk after arthroplasty, they did not differentiate between cemented and cementless techniques. In this study, we directly compared the two methods and found no overall increase in cancer risk associated with cement use. However, cemented fixation was linked to a higher incidence of multiple myeloma, particularly in patients under 70 years. This may be attributable to chronic inflammation, oxidative stress, and bone marrow microenvironmental changes induced by PMMA. While some site-specific cancer risks appeared lower in the cemented group, potential selection bias should be considered. The findings underscore the need for further mechanistic studies and long-term surveillance to clarify the implications of cement use in orthopedic procedures.

Patients who underwent cemented HA showed a higher risk of multiple myeloma than those who received cementless HA. The association between cement use and multiple myeloma was especially evident in younger patients. These findings highlight the importance of evaluating long-term risks associated with cemented HA to inform safer surgical approaches and guide treatment selection.