

Radiation Exposure in Fluoroscopy-Guided Total Hip Arthroplasty: A Systematic Review

Introduction: Intraoperative fluoroscopic guidance has shown to decrease acetabular component placement error and increase favorable patient outcomes. Thus, intraoperative fluoroscopy during total hip arthroplasty (THA) has become increasingly popular, despite exposing the patient and surgical staff to radiation.

Methods: PubMed, Cochrane, Embase, Web of Science, and Scopus were systematically searched for studies pertaining to intraoperative THA fluoroscopy, using the keywords “THA,” “fluoroscopy,” AND/OR “radiation exposure”. Studies including fluoroscopy time or radiation exposure were analyzed, and average fluoroscopy time and radiation exposure dose were computed. Patient demographics were also recorded.

Results: 11 studies were included, enrolling 1839 patients with a mean age of 62 (95% CI 59.0 – 64.4) years and an average patient body mass index of 27.8 (95% CI 26.9 – 28.6) kg/m². The average fluoroscopy time was 21.4 (95% CI 16.6 – 26.1) seconds and average radiation dose of 1.8×10^{-3} (95% CI 7.4×10^{-4} – 2.9×10^{-3}) Gy for patients. Overall radiation exposure to the surgeon was 7.7×10^{-5} (95% CI 1.4×10^{-5} – 1.4×10^{-4}) Gy. This dose is significantly lower than minimum radiation values linked to adverse patient effects (0.7 Gy and 2.0 Gy as thresholds for acute radiation syndrome and cutaneous radiation injury, respectively).

Discussion: While several studies fail to report fluoroscopy time and radiation dose in THA patients, those reporting these values include experienced surgeons well past the associated learning curve of fluoroscopy-guided THA. Nevertheless, fluoroscopy-guided THA emerged as a safe procedure, as patients and surgical staff are exposed to negligible radiation doses.