

Risk of Hip Arthroplasty After Open Reduction Internal Fixation of a Fracture of the Acetabulum: A Matched Cohort Study

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Purpose: Displaced or unstable fractures of the acetabulum are commonly treated with open reduction and internal fixation (ORIF) to restore hip joint congruity and minimize arthritic progression. The reported risk of subsequent hip replacement is between 8.5% and 14% in small case series. Using a longitudinal population-based cohort, our study aimed to: (1) define the rate and temporal relationship between acetabulum ORIF and eventual hip arthroplasty in a large population, and (2) identify risk-modifying patient, provider, and injury/surgical factors.

Methods: Administrative data sets (including the Ontario Health Insurance Plan physician billing database and the Canadian Institute of Health Information hospital admission database) were utilized to identify all patients over age 16 (for presumed skeletal maturity) in Ontario, Canada, who underwent acetabulum ORIF between July 1996 and March 2010. Excluded were non-Ontario residents, bilateral injuries, and prior hip surgery. The primary outcome was hip arthroplasty, defined by physician and procedural coding from cohort entry until March 2012. The Kaplan-Meier (K-M) time-to-event approach was utilized, censoring patients who died, emigrated from Ontario, or had hip fusion. Four patients from the general population were matched to each surgical patient for age, sex, income quintile, urban/rural address, and year of injury. Matched patients were excluded for prior hip surgery only. Rates of hip arthroplasty at 2, 5, and 10 years after the index date were compared. Among surgical cases, a Cox proportional hazards multivariate model was fit and included potentially predictive patient (demographic), surgical/injury (one- versus two-column fixation), and provider (surgeon volume, time from admission to surgery) factors for the risk of arthroplasty. Hazards ratios (HRs) with 95% confidence intervals were calculated.

Results: We identified 1725 patients (median age, 43 years [interquartile range (IQR) 30-54]; 72.5% male) who met criteria and were matched to 6900 controls. Among cases there was a 13.9% (N = 240) rate of hip arthroplasty after a median of 6.25 (IQR 3.5-10.1) years, compared to 0.6% (N = 38) among matched controls (relative risk = 23). The K-M survivorship was 99.9% (controls) and 91.4% (cases) at 2 years, 99.6% (controls) and 87.6% (cases) at 5 years, and 99.2% (controls) and 83.3% (cases) at 10 years. Only baseline comorbidity scores differed between cases and controls, which was adjusted in the final Cox model. Risk factors for hip arthroplasty among case patients included older age (HR 1.035 [1.027, 1.044]; $P < 0.0001$) and female sex (HR 1.65 [1.257, 2.165]; $P = 0.0003$). The median surgeon volume of acetabulum ORIF was 10 per year (IQR 4-19) overall, but was 7 per year (IQR 4-16) in patients who had an eventual arthroplasty, and 11 per year (IQR 4-19) in those who did not; a finding that was significant in multivariate Cox modeling, which revealed a 2.6% decreased risk of arthroplasty for each acetabulum ORIF above 10 per year (HR 0.974 [0.960, 0.989]; $P = 0.0007$) performed by the index surgeon.

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Conclusion: Patients who underwent acetabulum fracture ORIF had a 23-times higher prevalence of hip arthroplasty after 6.25 years compared to age- and sex-matched controls. The risk of eventual arthroplasty was greater in females and older patients. Hip arthroplasty was less likely after acetabulum ORIF performed by higher volume surgeons.