

Operative Versus Nonoperative Management of Humeral Shaft Fractures: A Systematic Review and Meta-Analysis of Randomized Studies

*William M. Oliver, MBBS; Katrina Roxanne Bell, MBChB; Samuel Molyneux, FRCS (Ortho); Timothy O. White, MD; Nicholas D. Clement, FRCS (Ortho); Andrew David Duckworth, PhD
Royal Infirmary of Edinburgh, Edinburgh, UNITED KINGDOM*

Purpose: The optimal management of adults with humeral shaft fractures remains uncertain. Nonoperative management is the default strategy but may be associated with high nonunion rates and unpredictable functional outcomes. The aim of this systematic review and meta-analysis was to compare the outcomes of operative and nonoperative management for adults with humeral shaft fractures, in terms of patient-reported upper limb function, health-related quality of life (HRQoL), radiographic outcomes, and complications.

Methods: Searches of MEDLINE, Embase, CINAHL (Cumulative Index to Nursing and Allied Health Literature), PubMed, CENTRAL (Cochrane Central Register of Controlled Trials), ClinicalTrials.gov, ISRCTN (International Clinical Trials Registry Platform) and OpenGrey (Repository for Grey Literature in Europe) were performed in September 2021. Inclusion criteria were published prospective randomized trials comparing operative and nonoperative management of humeral shaft fractures in adults. Of 715 articles initially identified, following full-text screening 5 studies were included in the systematic review and 4 studies in the meta-analysis. Data were extracted by 2 independent reviewers according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement. Methodological quality was assessed using the revised Cochrane risk-of-bias tool for randomized trials. Pooled data were analyzed using a random-effects model.

Results: The meta-analysis comprised 292 patients (mean age 41 years [range, 18-83], 67% male). Surgery was associated with superior DASH (Disabilities of the Arm, Shoulder and Hand) and Constant-Murley scores at 6 months (mean DASH difference 7.6, $P = 0.01$; mean Constant-Murley difference 8.0, $P = 0.003$), but there was no difference at 1 year (DASH, $P = 0.30$; Constant-Murley, $P = 0.33$). No differences in HRQoL (according to SF-36 [Short Form-36] or 15D scores) or pain level ($P = 0.57$ at 6 months, $P = 0.70$ at 1 year) were found. Surgery was associated with a lower risk of nonunion (0.7% vs 15.7%; odds ratio [OR] 0.13, $P = 0.004$) but a higher risk of transient radial nerve palsy (TRNP; 17.4% vs 0.7%; OR 8.23, $P = 0.01$). There was no significant difference in infection rate (OR 3.57, $P = 0.13$). Surgery was associated with a lower risk of re-intervention (1.4% vs 19.3%; OR 0.14, $P = 0.04$).

Conclusion: Surgery may confer an early functional advantage to adults with humeral shaft fractures, but this is not sustained beyond 6 months. The lower risk of nonunion and re-intervention should be balanced against the higher risk of TRNP.