

Comparison of Surgical and Nonsurgical Treatments for 3 and 4-Part Proximal Humerus Fractures in Patients Over 65 Years: A Network Meta-Analysis

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Purpose: Proximal humerus fractures (PHFs) are the third most common fracture type in individuals over 65 years. Treatment strategies include nonsurgical treatment (NST), open reduction and internal fixation (ORIF), hemiarthroplasty (HA), and reverse total shoulder arthroplasty (rTSA). We used network meta-analysis (NMA) of randomized controlled trials (RCTs) to compare the adverse events, reoperation rates, and functional outcomes associated for the treatment of 3 and 4-part PHFs in elderly patients.

Methods: We searched MEDLINE, Embase, Web of Science, and Cochrane Central electronic databases for RCTs comparing 3 and 4-part PHF treatments in the elderly. Ultimately 8 papers met our inclusion criteria for NMA. We extracted information on country, sample size, age, length of follow-up, adverse event rates, additional surgery rates, Constant scores, and Disabilities of the Arm, Shoulder and Hand (DASH) scores. There was no significant heterogeneity among included studies, and the probability of publication bias was not significant per Egger's test ($P = 0.21$). Therefore, a fixed effect analysis was employed. The pooled standardized mean difference (SMD) was calculated and presented with 95% confidence interval (CI). Pooled risk ratio (RR) with 95% CI was used to compare adverse event and additional surgery rates.

Results: Eight RCTs were included with a total of 364 participants and an average age of 73.4 years. rTSA resulted in significantly better combined Constant/DASH score than HA at the latest available follow-up time (SMD = 0.89; 95% CI = 0.36-1.41; $P < 0.01$). There were no significant differences between ORIF versus NST, HA versus NST, and HA versus ORIF. rTSA was associated with a lower adverse event rate than HA (RR = 0.57; 95% CI = 0.36-0.90; $P = 0.02$) while ORIF was associated with a higher rate than NST (RR = 1.45; 95% CI = 1.10-1.91; $P < 0.01$). There were no significant differences between HA versus NST and HA versus ORIF. ORIF was associated with an increased rate of additional surgery compared to NST (RR = 8.13; 95% CI = 2.10-31.60; $P < 0.01$). There were no significant differences between rTSA versus HA, HA versus NST, and HA versus ORIF.

Conclusion: This study supports the accumulating body of evidence suggesting that NST should be the preferred treatment strategy. In cases where surgical treatment is deemed necessary, rTSA should be preferred over HA as it produces better outcomes, a lower rate of adverse events, and no difference in rates of additional surgery.