

Safety and Efficacy of Operative Versus Nonsurgical Management of Distal Radius Fractures in Elderly Patients: A Systematic Review and Meta-analysis

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Purpose To assess the safety and efficacy of operative versus nonsurgical treatment of distal radius fractures in elderly patients.

Methods We comprehensively searched the PubMed, Web of Science, and Cochrane Library databases for studies that satisfied predetermined inclusion and exclusion criteria. Outcomes of interest included pain level, grip strength, wrist range of motion, wrist functional assessment, radiographic parameters, and complications; we compared these using continuous measurements. We performed a systematic review and meta-analysis to assess operative versus nonsurgical procedures in patients aged 60 years and older.

Results Two randomized controlled trials and 6 retrospective studies were included. Meta-analysis did not detect statistically significant differences in pooled data for pain level, functional assessment, and wrist range of motion between the operative and nonsurgical groups. Grip strength was significantly greater in the operative group. The incidence of major complications requiring surgery and that of tendon injury were significantly higher in the operative group. Radiographic outcomes including volar tilt, radial inclination, and ulnar variance were significantly better in the operative group. Considerable heterogeneity was present in all studies and adversely affected the precision of the meta-analysis.

Conclusions The current literature does not support the theory that operative management can provide better clinical outcomes for elderly patients with distal radius fractures. Although operative management can offer better radiographic outcomes and grip strength than can nonsurgical treatment, the risk of complications requiring surgical treatment is greater. Thus, indications for operative fixation should be considered carefully in the treatment of elderly patients. (*J Hand Surg Am.* 2016;41(3):404–413. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic III.

Key words Meta-analysis, operative, nonsurgical, elderly patient, distal radius fractures.

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DISTAL RADIUS FRACTURES (DRFs) are common injuries in elderly patients and can cause wrist joint disability. These fractures frequently result from falls from a standing height and other low-energy trauma in elderly patients. Initial treatment usually consists of closed reduction and cast immobilization, which is a simple, safe, and cost-effective intervention.^{1,2} If the initial reduction fails to meet acceptable radiographic parameters, operative management such as internal or external fixation may

be used.^{3,4} However, whether an operative or non-surgical approach is best for treating a DRF in an elderly patient remains controversial because the fracture reduction does not appear to be as strongly associated with functional outcomes as it does in younger patients.^{5–7} Malunion in elderly patients does not necessarily translate into unsatisfactory functional outcomes, and many elderly patients have satisfactory functional results despite imperfect reduction and malunion.^{6–10}

Some physicians advise surgical fixation because it improves stability and enhances earlier recovery of range of motion (ROM).^{11–13} Although cast immobilization avoids the potential complications of surgery, it may be inconvenient or uncomfortable for patients and delay their return to activities of daily living. It is also associated with a certain risk of late fracture collapse and malunion.^{1,8–10,14}

The patient guidelines of the American Academy of Orthopaedic Surgeons provide a comprehensive description of this topic.¹⁵ The guidelines do not recommend for or against operative treatment for elderly patients with DRFs owing to a lack of compelling evidence or meta-analyses that have examined whether operative management produces better outcomes than nonsurgical approaches. The purpose of the current meta-analysis was to compare functional and radiographic outcomes and complications in patients aged 60 years or older with those in patients who had a DRF treated by open reduction internal fixation (ORIF) with plate osteosynthesis or external fixation (operative group) or by closed reduction and cast immobilization (CRCI) (nonsurgical group).

MATERIALS AND METHODS

Study selection

Two of the authors independently carried out a comprehensive search of the PubMed, Web of Science, and Cochrane Library electronic literature databases in April 2015 to identify randomized controlled trials (RCTs) and cohort studies (both prospective and retrospective) that evaluated the outcomes of operative or nonsurgical management for DRFs in elderly patients. The following Medical Subject Headings terms and their combinations were searched in [Title/Abstract]: “treatment/management/therapy,” “aged/elder/old,” and “distal radius (radial)/Colles/Smith fracture/wrist injuries.” We also scanned the reference lists of the included articles for additional articles that met the inclusion criteria. Duplicate data were excluded and no language restrictions were placed on the search results.

Inclusion and exclusion criteria

For inclusion, studies had to provide data for patients aged 60 years or older, provide clinical and radiographic evidence of DRFs, and be original articles and involve human subjects. The articles also had to apply treatment options of CRCI, ORIF, or external fixation; define unstable DRFs based on redisplacement after the initial reduction exceeding the acceptable fracture alignment for cast immobilization (dorsal tilt greater than 10° or volar tilt greater than 15°, radial inclination less than 10°, ulnar positive variance greater than 2 mm, and any intra-articular stepoff greater than 2 mm)^{16,17}; and include a minimum follow-up of 12 months.

We excluded studies if they did not meet these inclusion criteria; included fewer than 40 patients; did not report outcomes or complications; used nonstandard procedures such as internal and external fixation of the same fracture or intramedullary wire fixation; or included DRFs associated with carpal fractures, other associated injuries, and open fractures. Editorials, letters to the editor, review articles, case reports, and studies in animals were excluded.

Data extraction and outcomes of interest

Two authors independently extracted and summarized data from the included studies. Any disagreement was resolved by the adjudicating senior authors. The reviewers resolved disagreement by discussion and consensus.

Clinical outcomes were pain level (according to a visual analog scale [VAS] in which 0 represented no pain and 10 represented severe pain), grip strength, wrist ROM, and wrist functional assessment. The Patient-Rated Wrist Evaluation (PRWE) score (range, 0–100, with 0 indicating that the patient was asymptomatic)¹⁸ and the Disabilities of the Arm, Shoulder, and Hand (DASH) score (range, 0–100, with 0 as the best result)¹⁹ were used to assess functional outcomes in most included studies. Complications occurring after treatment were subdivided into minor and major according to a validated complication checklist developed by McKay and colleagues.²⁰ Complications not requiring surgical treatment (ie, superficial wound infections, complex regional pain syndrome [CRPS], steroid injection, and physiotherapy) or further investigations (ie, electromyography) in the studied populations were graded as minor.^{8–11,14,20,21} Major complications included deep infections, nerve or tendon injury, and hardware loosening or failure that led to reoperation.^{8–11,14,20,21} Radiographic parameters included volar tilt angle, radial inclination angle, ulna variance, radial height and gap, and step

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