Parallel vs. Orthogonal Dual Plating for Distal Humerus Fractures: A Systematic Review and Pooled Analysis of Functional Outcomes and Union Times

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Abstract:

Objective
The primary purpose of this study was to determine whether open reduction and internal fixation (ORIF) utilizing parallel or orthogonal dual plating resulted in improved function, as measured by the Mayo Elbow Performance Score (MEPS). Additionally, this study investigated whether union time was influenced by the method of fixation.

Methods
A systematic review and pooled analysis was conducted utilizing five databases to search for articles examining orthogonal and parallel dual plating methods for the treatment of distal humerus fractures. Statistical analysis was conducted utilizing IBM SPSS Statistics for Windows, versions 29. Included studies were randomized controlled trials and prospective cohort studies. Outcomes of interest were the Mayo Elbow Performance Score (MEPS) and fracture union time.

Results
MEPS were assessed across six studies via pooled analysis. The orthogonal plating group included five studies (n=152) that evaluated MEPS at 6, 12, and 24 months postoperatively. The analysis yielded scores of 75.35 ± 3.18, 88.11± 0.18, and 85.10 ± 0.00, respectively. MEPS for the parallel plating group were assessed across four studies (n=176) at 6, 12, and 24 months postoperatively. The analysis yielded scores of 78.73± 0.00, 93.61± 0.00, and 88.745± 0.92, respectively.

Union time was assessed across five studies. Pooled analysis for the orthogonal plating group across four studies (n=89) revealed a union time of 22.96 ± 5.05 weeks. Pooled analysis for the parallel plating group across four studies (n=100) revealed a union time of 19.59 ± 6.08 weeks.

Conclusion
A comparative pooled analysis of orthogonal plate repair versus parallel plate repair for distal humerus fractures revealed that parallel fixation provided superior MEPS scores across all time points and achieved fracture union approximately three weeks earlier than the orthogonal group.