

A Prospective Randomized Trial of Plate Fixation versus Tension Band Wire for Olecranon Fractures

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Purpose: Tension band wire (TBW) fixation is the most commonly employed technique for isolated displaced fractures of the olecranon, with plate fixation a noted alternative. A recent Cochrane review concluded that further work is needed in this area to determine the optimal surgical management of simple isolated fracture of the olecranon. The aim of this single-center, single-blind, randomized controlled trial was to compare patient-reported and functional outcomes, complications, and economic costs for displaced olecranon fractures managed with either TBW or plate fixation. The null hypothesis was that there is no difference between groups in the patient-reported outcome at 1 year postinjury.

Methods: We performed a registered prospective randomized, single-blind, single-center trial in 67 patients aged between 16 and 74 years with an acute isolated displaced fracture of the olecranon. Patients were randomized to either TBW (n = 34) or plate fixation (n = 33). The primary outcome measure was the Disabilities of the Arm, Shoulder and Hand (DASH) score at 1 year postinjury. Secondary outcome measures included surgeon-reported outcome measures, complications, pain, and cost. A power analysis determined a total sample size of 50 patients (25 per group) was required to provide 80% statistical power to detect significant differences (0.05) in the DASH score at 1 year, assuming an effect size of 0.8. Intention to treat analysis was performed.

Results: The baseline demographic and fracture characteristics of the two groups were comparable. The mean age of patients was younger in the TBW group (43 vs 52 years). The 1-year follow-up was 85%. There was a significant improvement in elbow function over the 12 months following injury in both groups ($P < 0.001$). At 1 year following surgery the DASH score for the TBW group was not statistically different from the plate fixation group (12.8 vs 8.5; $P = 0.315$). There was no significant difference between groups in terms of elbow flexion arc, forearm rotation arc, Broberg and Morrey Score, the Mayo Elbow Score, or the DASH at all the assessment points over the 1 year following injury (all $P = 0.05$). Complication rates were significantly higher in the TBW group (63% vs 38%; $P = 0.042$), predominantly due to a significantly higher rate of symptomatic metalwork removal (50.0% vs 22%; $P = 0.021$). Overall, the mean cost per patient was not significantly different between the two groups ($P = 0.131$).

Conclusion: In active patients with an isolated displaced fracture of the olecranon, no difference was found in the patient-reported outcome between TBW and plate fixation at 1 year following surgery. The complication rate is higher following TBW fixation due to a high rate of symptomatic metalwork removal.