

Plate Fixation of Midshaft Clavicle Fractures for Delayed Union and Nonunion Is a Cost-Effective Intervention But Functional Deficits Persist at Long-Term Follow-up

*Benjamin James Fox MBChB; Nicholas D Clement; Deborah Jane Macdonald BA; Christopher M Robinson MD; Jamie A Nicholson MBChB
Royal Infirmary of Edinburgh, Edinburgh, United Kingdom*

Purpose: The primary aim of this study was to compare the long-term functional outcome of midshaft clavicle fracture fixation for delayed (≥ 3 months) and nonunion (≥ 6 months) compared to a matched cohort of patients who achieved union with nonoperative management. The secondary aim was to assess cost-effectiveness of fixation.

Methods: A consecutive series of patients over 10 years were retrospectively reviewed using the QuickDASH (an abbreviated version of the Disabilities of the Arm, Shoulder and Hand [DASH] questionnaire), Oxford Shoulder Score (OSS) and EuroQol 5 Dimensions (EQ-5D). These patients were compared to a matched cohort that achieved union after nonoperative management using propensity score matching. The time horizon for the cost-effectiveness analysis was 4.1 years, which was the mean time of follow-up. Costs were derived from the Scottish National Tariff and local hospital procurement costs. The health-care cost of delayed union fixation was modeled for each patient at time of follow-up retrospectively, factoring in any secondary procedures or complications.

Results: 60 patients (follow-up 79%, $n = 60$ of 76) at 4.1 years postoperatively (range, 1.1-10.0 years) had a QuickDASH of 16.5 (95% confidence interval [CI] 11.6-21.5), OSS of 41.5 (39.0-44.1) and EQ-5D of 0.7621 (0.6822-0.8421). One in five patients were dissatisfied with their final outcome ($n = 13$ of 60). Functional outcome was inferior following fixation when compared to patients who united with nonoperative management (QuickDASH 16.5 vs 5.5, $P < 0.001$; and EQ-5D 0.7621 vs 0.9073, $P = 0.001$). However, significant improvements were found when compared to preoperative scores (QuickDASH $P < 0.001$ and EQ-5D $P < 0.001$). The cost per quality-adjusted life year for fixation was £5624.62 (\$7691.02) for the study cohort.

Conclusion: Clavicle fixation for delayed and nonunion is a cost-effective intervention but outcomes are worse compared to patients who unite with nonoperative management.