

**Healing Rate, Complications, and Patient-Reported Outcome Measures Associated with Plate Fixation and Autologous Bone Grafting for Clavicle Nonunion**

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**Purpose:** Clavicle nonunion is an uncommon yet debilitating complication of acute clavicle fracture and is associated with shoulder dysfunction and pain. Management typically involves open reduction and internal fixation (ORIF) with bone grafting. Although this treatment has been well described, patient-reported outcome measures (PROMs) for this intervention have not been widely studied. The purpose of the current investigation is to evaluate the healing rate, complications, and PROMs among clavicle nonunion patients treated with ORIF and bone grafting.

**Methods:** Clinical and hospital records were evaluated for 59 consecutive adult patients seen and treated by a single surgeon at a quaternary referral center for management of a clavicle nonunion. Pre- and postoperative outcomes were assessed with the Short Form-12, Brief Pain Inventory, Disabilities of the Arm, Shoulder and Hand (DASH), and Time Trade-off questionnaires and improvement analyzed using repeated-measures analysis of variance.

**Results:** The case series included 59 adult patients (38 males, 21 females) with an average age at injury of 39.9 years. All initial clavicle fractures were closed and 19 (32%) were comminuted. At presentation to our institution, 44 patients (75%) had been treated nonoperatively for their acute fracture for a mean of 15 months (range, 2-120). To address nonunion, 27 patients (46%) had single plating and 32 (54%) had double plating, all with bone grafting performed by the same surgeon. Treatment was successful in uniting 98% of all clavicle nonunions. One patient (2%) had a persistent nonunion and 3 patients (5%) required more than one procedure to obtain bony union. Three patients (5%) were lost to follow-up. Complications included infection with positive cultures for *Propionibacterium acnes* in 2 patients (3%) and symptomatic hardware in 6 patients (10%). In 25 patients with both pre- and postoperative PROMs at a mean 7.1 years, there was statistically significant improvement in all functionality scores ( $P \leq 0.001$ ).

**Conclusion:** Our study demonstrates that plate fixation with autologous bone grafting is a reasonably safe and effective intervention to address nonunion with PROMs, indicating that patients demonstrate significant functional improvement.