

**Reducing Unnecessary Fixation of Midshaft Clavicle Fractures***Nicholas Murray, MBChB; Toby Johnson, MBBS; Iain Packham, FRCS;**Mark A.A. Crowther, MBBS, FRCS; Tim Chesser, FRCS**North Bristol NHS Trust, Bristol, United Kingdom*

**Purpose:** Recent evidence has shown displaced midshaft clavicle fractures have a nonunion rate of between 10% and 20% and have led to an exponential increase in operations for fixation. However, those who unite with conservative treatment have similar outcomes to those who undergo operative treatment. Protocols to identify those patients who will go on to a nonunion are important, so that scarce health-care resource can be targeted, and patients do not undergo unnecessary surgery. The aim of this study is to report one such protocol.

**Methods:** A protocol was introduced, where all isolated closed midshaft clavicle fractures were initially managed nonoperatively in a sling. At up to 2 weeks, all patients were reviewed and those who were struggling with their symptoms, or requested fixation, proceeded to surgery with the remainder mobilized as comfortable. All cases treated at 1 center over a 3-year period, with a minimum follow-up of 1 year, underwent case note review. Data collected included demographics, classification of the fracture, timing of surgery, incidence of nonunion or symptomatic malunion, and the requirement for subsequent surgery.

**Results:** Between January 2015 and December 2017, 613 clavicle fractures were managed through fracture clinic. 347 were middle third (56%), 255 were distal, and 11 medial fractures. Of the 347 middle third fractures, 75% were male, mean age 41 years (range, 16-97) and 225 (65%) were displaced. 41 middle third clavicle fracture patients underwent early fixation, with 8 of these managed out with the protocol and were excluded. A total of 33 (9.5%) were managed operatively through the protocol with the number of days to operation 4-57 with a median of 15 days. 11 patients required late fixation for symptomatic delayed, non-, or malunion; of these 4 had not been managed through the protocol treated initially elsewhere or were polytrauma patients who did not undergo acute fixation. Of the 7 cases included, time to surgery was 193-494 days with an average of 378 days. Six were symptomatic nonunions (1.7%) and 1 was a symptomatic malunion (0.3%). Using the protocol the early operative rate was 10% (33 of 339 patients or 15% of displaced fractures), the later nonunion or symptomatic malunion rate was 2% (3% of displaced fractures). This led to a total operative rate of 12% (18% of the displaced fractures).

**Conclusion:** A protocol devised and introduced for managing middle third clavicle fractures in this hospital has demonstrated through this retrospective observational study an effective means of managing these injuries. It is cost-effective, reducing the number of patients requiring fixation with a fixation rate of 10% while reducing the rate of symptomatic non- and malunion (2%). Limitations of the study include lack of functional outcomes and potential to loss of follow-up for symptomatic malunions or nonunion. The management pathway is simple and reduces unnecessary surgery and cost. It could be introduced into any orthopaedic outpatient department with ease.