

**Minimally Invasive Plate Osteosynthesis for Displaced Midshaft Clavicular Fractures***Iain Elliott, MD; William Uffmann, MD; Zachary Working, MD; Erik Kubiak, MD**University of Utah Department of Orthopaedics, Salt Lake City, Utah, USA*

**Purpose:** Traditionally, when displaced midshaft clavicle fractures are treated with open reduction and internal fixation, a longitudinal incision is placed anteriorly or superiorly over the clavicle for reduction and fixation. This approach puts both cutaneous nerves and clavicular periosteal blood supply at risk. We hypothesized that minimally invasive plate osteosynthesis (MIPO) of the clavicle would result in low complication rates and be a reasonable treatment option for displaced midshaft clavicle fractures. MIPO involves plating the clavicle with a precontoured plate applied via a medial or lateral saber or vertical incision.

**Methods:** All patients with closed, midshaft clavicle fractures that underwent MIPO by a single surgeon at a Level I trauma center from 2007-2015 were reviewed. All patients with follow-up of a minimum of 6 weeks were included. Patient demographics and presence or absence of smoking and diabetes were recorded. The initial fracture displacement and angulation was recorded from preoperative radiographs. Reoperation for any reason was recorded.

**Results:** A total of 51 patients who underwent MIPO for displaced midshaft clavicle fractures were available for review. Six patients had no follow-up and were excluded from our analysis leaving 45 total patients. Average age was 34.8 years. Average radiographic follow-up was 40.3 weeks. Average shortening at presentation was 24 mm, with average displacement 31 mm. Cycling was the most common cause of clavicle fracture in this cohort (n = 16, 36%), followed by motor vehicle crashes including ATV accidents (n = 8, 18%) and falls (n = 8, 18%). Three patients underwent reoperation (n = 3, 6.7%), one for infection (n = 1, 2.2%), and two for symptomatic hardware removal (n = 2, 4.4%). There were no reoperations for nonunion or malunion in our cohort. The patient who presented with an infection did so 24 months after her index procedure.

**Conclusion:** Minimally invasive plate osteosynthesis is a viable option for displaced midshaft clavicle fractures, with only three patients undergoing reoperation at an average follow-up of 40 weeks.