

2019 NEHS Annual Meeting Abstract Submission

ABSTRACT TITLE *	Skinny Wire and Plate Fixation for Complex Intraarticular Distal Humerus Fractures: A Novel Surgical Technique and Results
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Name of who will present abstract at NEHS meeting on December 6, 2019 Please note that the same person cannot present more than one abstract at the meeting. *	Jeffrey J Olson, MD
Please indicate if the presenter is: *	<ul style="list-style-type: none">Resident
List full names of abstract authors *	Jeffrey J. Olson, MD George S.M. Dyer, MD We would like to be considered for the H. Kirk Watson, MD Founder's Award. Thank you.

ABSTRACT – should include background information and a description of methods, programs, or practices. *

Introduction:

Intraarticular distal humerus fractures comprise approximately 1–2% of all adult fractures and typically occur as a result of high–energy injuries in young adults or low–energy falls in the elderly. Surgical fixation is often technically difficult owing to poor bone quality and/or numerous articular and metaphyseal fragments. Stable fixation is difficult to achieve even with modern techniques and post–operative outcomes are historically poor with loss of fixation and nonunion, elbow stiffness due to arthrosis and contracture, and permanent disability common. There has been a trend towards treating these fractures with total elbow arthroplasty, which in practice is often complicated by mechanical failure and infection. A successful total elbow requires permanent weightbearing restrictions and change in lifestyle for active individuals. We describe a novel surgical technique that confers stable fixation and allows early range of motion resulting in a high rate of union, excellent, functional outcome, and ability to return to physical work and high–demand leisure activities.

Methods:

Thirty–one patients with intraarticular distal humerus fractures treated with a novel surgical technique from 2014–2019 were retrospectively reviewed. The surgical technique is described as follows. The distal humerus is exposed in standard fashion. The articular fragments are anatomically aligned and fixed utilizing numerous skinny 1.25–2.3 mm Kirshner wires passing transversely from the lateral to medial column, creating a rigid articular block with a reconstructed joint surface. The metaphyseal fragments are restored and reduced, thereby linking the articular segment and distal humeral shaft. Distal humerus locking plates are subsequently placed and fixed along the lateral and/or medial columns producing the final construct. The long, skinny wires used for the articular block are cut flush along the medial column, bent over the lateral column, and trapped beneath the lateral column plate to prevent migration and effectively to unify them into a fixed–angle fixation device. Patients are splinted post–operatively for soft tissue rest and then early, unlimited range of motion with limited weightbearing initiated following their two–week follow up visit.

Results:

Our patient cohort had a mean age of 59 (19–90) years and 61% were female with a median (interquartile range) follow up of 1.3 (0.9–2.2) years follow up. Twenty–six percent were reported to have osteopenia or osteoporosis. Four were on chronic immunosuppression. Ninety percent occurred as a result of a fall, 71% fall from standing, two motorcycle crashes and one gunshot wound; 29% were due to high–energy mechanisms. Five patients (16%) suffered an additional

concurrent ipsilateral upper extremity injury. Twenty-seven (87%) were AO type C fractures and 4 (13%) were type B. Five patients (16%) sustained open fractures, one suffered a primary ulnar nerve palsy, and one patient with an ipsilateral forearm fracture underwent fasciotomy for evolving symptoms of compartment syndrome. Average time to ORIF was 3.5 (0–29) days. Mean operative time was 152 minutes and mean length of stay 2.2 days. There was a 100% union rate, with average time to heal, 11 weeks. Twelve (38%) patients experienced post-op paresthesia of the ulnar nerve; ten exhibited recovery by final follow up. Eight patients (26%) underwent reoperation, seven for hardware removal, two for ulnar nerve neurolysis/transposition, and three for capsular release for stiffness. One patient was converted to total elbow arthroplasty for post-traumatic arthritis and delayed union of the olecranon osteotomy. Over eighty percent of patients reported zero or mild pain. Patients achieved a mean 102 (40–140) degree arc of motion, 116 degrees flexion and –21 degrees extension. Average QuickDASH score (n= 21 patients) was 25.3 (0–74) and average PROMIS Global Mental and Physical scores were 54 and 49, respectively.

Conclusion:

We describe a novel surgical technique that creates a rigid construct for open reduction, internal fixation of complex intraarticular distal humerus fractures. We report a 100% union rate in all patients treated with this technique, with low levels of pain, excellent measures of elbow range of motion, and good patient reported outcome scores post-operatively. Many patients returned to physical work (e.g. construction, fire-fighting, demolitions), or high-demand leisure activity (e.g. kayaking, yoga, rock-climbing), making this a compelling alternative to total elbow arthroplasty. Patients should be counseled about high rates of post-operative ulnar nerve paresthesias that can be expected to improve over time and high reoperation rates for symptomatic hardware.
