Subperiosteal Elevation of the Ulnar Nerve Is a Safe and Effective Way to Minimize Postoperative Ulnar Neuritis in Distal Humerus Fractures

George Ochenjele, MD*; Margaret A. Sinkler, MD; Ramon Arza, BS; Mina Ayad, BS; Luc M. Fortier, MD; Joshua Napora, MD; George Ochenjele, MD*

Purpose: During fixation of distal humerus fractures, the ulnar nerve can be managed with in situ decompression (ISD), anterior transposition (AT), or a lesser discussed technique, subperiosteal elevation (SE). Our aim is to describe this method and compare ulnar neuropathy rates between the techniques.

Methods: We retrospectively reviewed 125 distal humerus fractures that underwent open reduction and internal fixation at a Level I trauma center. Nerve injury was identified by deficits documented within the physical examination. The patients were grouped based on intraoperative management of the ulnar nerve: SE, AT, and ISD. SE is performed by identifying the ulnar nerve within the cubital tunnel where it is then raised off the ulna subperiosteally and temporary mobilized anterior to the medial epicondyle to protect the nerve throughout the entire procedure. The nerve is mobilized while maintaining most of its soft-tissue envelope. All statistical tests were conducted at the $P<0.05$ significance level.

Results: The cohort comprised of females (52%) with a mean age of 58 years, who sustained a majority of ground level falls (58%). 96 (77%) were intra-articular fractures (AO/OTA type 13A-C). Within the 125 patients, 35 received SE, 63 ISD, and 27 AT of the ulnar nerve. 12 patients (34%) receiving SE had preoperative ulnar neuropathy. At postoperative evaluation, 100% resolved with 2 (6%) new cases of postoperative ulnar neuritis. For the 63 patients receiving ISD, 13 (21%) had a preoperative ulnar neuropathy. Nine (69%) resolved postoperatively with 5 (8%) cases of new onset postoperative neuritis. Of the 27 patients receiving AT of the ulnar nerve, 9 had preoperative ulnar neuropathy of which 3 (33%) resolved by postoperative evaluation with 7 (26%) cases of new onset postoperative ulnar neuritis. Compared to AT, SE had fewer cases of new postoperative ulnar neuritis ($P = 0.019$) and more preoperative symptom resolution ($P = 0.002$) while SE performed similarly in both regards when compared to ISD ($P>0.05$). Multivariate logistic regression identified AT as an independent risk factor for postoperative ulnar neuropathy (odds ratio [OR] = 5.2, $P = 0.023$).

Conclusion: Intraoperative management of the ulnar nerve with SE is a safe and effective way to minimize ulnar neuritis during distal humerus fracture fixation and improved neuropathy recovery. AT should be avoided due to a significant association with postoperative ulnar neuritis.

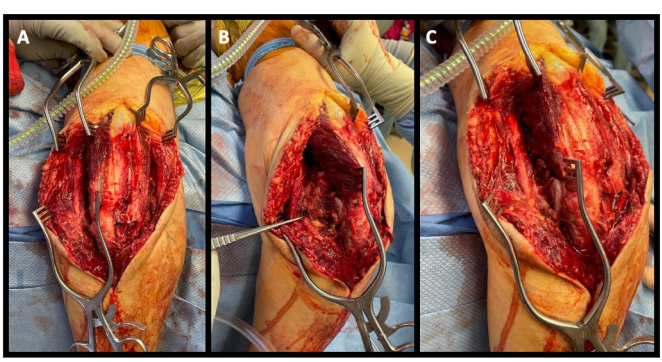

Figure 1: A: The ulnar nerve is released from the triceps fascia. B: Following the release, the nerve remains invested in the brachialis fascia. C: The nerve and surrounding muscle is elevated subperiosteally within the structures of the cubital tunnel.