Outcomes After Ulnar Nerve *In Situ* Release During Total Elbow Arthroplasty

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Purpose Ulnar nerve (UN) lesions are a significant complication after total elbow arthroplasty (TEA), with potentially debilitating consequences. Outcomes from a center, which routinely performs an *in situ* release of the nerve without transposition, were investigated.

Methods Eighty-three primary TEAs were retrospectively reviewed for the intraoperative management of the UN and presence of postoperative UN symptoms.

Results Three patients had documented preoperative UN symptoms. One patient had a prior UN transposition. The nerve was transposed at the time of TEA in 4 of the remaining 82 elbows (5%). The indication for transposition in all cases was abnormal tracking or increased tension on the nerve after insertion of the prosthesis. Of the 4 patients who underwent UN transposition, 2 had postoperative UN symptoms. Both were neuropraxias, which resolved in the early postoperative period. The remaining 78 TEAs received an *in situ* release of the nerve. The incidence of postoperative UN symptoms in the *in situ* release group was 5% (4 of 78). Two patients had resolution of symptoms, whereas 2 continued to experience significant UN symptoms requiring subsequent transposition. Seven patients had preoperative flexion of less than 100°. Of these, 2 had a UN transposition at the time of TEA. Of the remaining 5 elbows with preoperative flexion less than 100°, 2 had postoperative UN symptoms after *in situ* release, with 1 requiring subsequent UN transposition.

Conclusions A 3% incidence of significant UN complications after TEA compares favorably with systematic reviews. We do not believe that transposition, which adds to the handling of the nerve and increases surgical time, is routinely indicated and should rather be reserved for cases with marked limitation of preoperative elbow flexion or when intraoperative assessment by the surgeon deems it necessary. *(J Hand Surg Am. 2015;40(9):1832–1837.*

Type of study/level of evidence Therapeutic IV.

Key words Complications, *in situ* release, total elbow arthroplasty, transposition, ulnar nerve.

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TOTAL ELBOW ARTHROPLASTY (TEA) is usually a successful procedure with pain relief and improvements in range of motion in a broad range of elbow arthropathies.[1–4] The growth of interest in elbow arthroplasty is comparable to that for total hip and knee arthroplasty as it becomes increasingly used for acute fractures and their sequelae.[3,5–11] However, the incidence of complications of 20% to 45% is markedly higher than that of other large joint arthroplasties, and therefore the surgical technique,

together with other modifiable factors, needs to be scrutinized.[12–16]

Little et al found permanent ulnar nerve (UN) lesions to be one of the most common postoperative complications after TEA, with a 5% incidence in a systematic review of 3618 TEAs.[14] Kim et al reported permanent postoperative UN dysfunction in 6% to 10% of patients from centers that performed routine UN transposition in primary TEA.[17–19] In an earlier review of complications in TEA, which looked at 957 TEAs performed between 1986 and 1992, Gschwend et al reported an 11% incidence of UN complications.[12] They believed that the 2% incidence (3 of 173) of UN complications in their patient cohort after *in situ* decompression was a result of their approach, where the nerve was not transposed. Two decades after publishing these findings, the literature still provides few answers with regard to the management of the UN in TEA, as systematic reviews continue to be plagued by the poor documentation of UN complications. Two recent systematic reviews found that 15% of papers recorded preoperative UN symptoms, more than 20% of studies did not report on the intraoperative handling of the nerve, and more than 40% did not record the presence of postoperative UN neuropraxias.[13,14]

Routine transposition is frequently recommended.[17,20,21] Proponents of transposition believe that the nerve is placed in a safer position, protected during surgery, and not subjected to the same stretching and compressive forces during postoperative mobilization. The possible disadvantages of transposition include the increased surgical dissection and associated risk to the blood supply, mechanical injury from increased handling of the nerve, and increased operative time. The larger medial skin flap required for transposition may increase the risk of medial wound breakdown. Any subsequent need for neurolysis of a previously transposed nerve would likely further devascularize the nerve with the potential for ischemia or even infarction. Outcomes of neurolysis after TEA have been shown to be less predictable if a transposition has been performed previously.[22]

We investigated the incidence of UN complications at a center where UN release without transposition is routinely performed. Our hypothesis was that a complete *in situ* release of the UN would result in a low incidence of postoperative UN symptoms, bringing into question the practice of routine UN transposition in TEA.

MATERIALS AND METHODS

A list of all patients who underwent a primary TEA between 2003 and 2012 at the University of Cape Town Shoulder and Elbow Unit was obtained from a surgical database. These patients formed the study cohort and their medical records were reviewed. Data captured included patient demographics, preoperative range of motion and presence of UN symptoms, history of prior UN transposition, surgical time and intraoperative management of the nerve, and the presence of postoperative UN symptoms. The study was approved by the Department of Surgery Research Committee of the University of Cape Town.

We identified 81 consecutive patients who underwent 91 primary TEAs. Ten patients underwent bilateral TEAs during the study period. Eight patients with inadequate records were excluded from the study, leaving 83 TEAs for analysis (47 right, 36 left). All procedures were performed or supervised by the senior authors (B.C.V., S.J.R.).

Surgical technique

A posterior midline skin incision is used, curved to pass lateral to the olecranon tip. Full thickness subcutaneous flaps are developed and the UN is located proximally under the medial edge of the triceps. A full release of the nerve from its anatomical constraints is routinely performed on its dorsal surface, extending distally into the fascia bridging the heads of flexor carpi ulnaris. We believe that these anatomical constraints, particularly the cubital tunnel fascia, are pathologically thickened in the inflammatory arthropathies and form the most significant potential source of constriction resulting in postoperative UN symptoms. No attempt is made, however, to perform a circumferential dissection of the nerve, and the anterior tissue bed and accompanying blood supply are preserved as much as possible. At the level of the joint and just proximal, the nerve is mobilized with a cuff of triceps fascia and capsule. This cuff of tissue remains attached to the lateral edge of the UN (Fig. 1A) and is sutured back to the triceps edge during closure, thus returning the nerve to its preoperative position (Fig. 1B). The cuff of tissue separates the nerve from the prosthesis and typically allows for stable tracking without subluxation when postoperative flexion is initiated. Careful subperiosteal dissection is continued around the medial joint line, particularly in arthritic elbows where the typically prominent medial ulna osteophyte is in close proximity to the UN. This subperiosteal dissection facilitates the creation of the cuff of tissue, which will be used to return and stabilize the UN to its original position during closure. Distally the nerve is released well into the flexor carpi ulnaris with care taken to visualize and protect the first motor branch. The