

Ultrasound Guided Carpal Tunnel Release Using a Novel Device: Early Clinical Results

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INTRODUCTION

- Over 600 cases of ultrasound guided carpal tunnel release (UGCTR) have been reported in the peer-reviewed literature without complication and with excellent efficacy.¹⁻⁶ Nonetheless, concerns with respect to safety and technical difficulty may prevent more widespread adoption of this promising technique. The purpose of this study is to present the early clinical results following UGCTR using the SX-One MicroKnife, a novel, commercially available device with integrated safety and usability features.

MATERIALS AND METHODS

- UGCTR was performed on 28 patients (38 wrists) ages 42-90, including 3 patients (5 wrists) who were crutch or wheelchair dependent. All procedures were performed by a fellowship trained physiatrist (22 wrists) or one of two fellowship trained orthopedic hand surgeons (16 wrists) in three different practices using the SX-One MicroKnife, which allows single-handed operation and dynamically expands the safe zone within the carpal tunnel through the use of inflatable balloons. 17/38 wrists were released in an outpatient clinical setting using local anesthesia only, 21 in the operating room under sedation. Primary outcomes included complications, Boston Carpal Tunnel Questionnaire (BCTQ) and QuickDASH score, and one global satisfaction (1 = very dissatisfied, 2 = dissatisfied, 3 = neither satisfied nor dissatisfied, 4 = satisfied, 5 = very satisfied). One-month data were available at the time of abstract submission, and longer-term results are being prospectively collected.

RESULTS

- UGCTR was successfully completed on all 38 wrists without complication, including 10 simultaneous bilateral releases. No procedures required conversion to an alternative technique and all patients were allowed to immediately resume normal activities, including crutch and wheelchair use. At 1-month follow-up no complications occurred and the average global satisfaction score was 4.1 for all patients. Pre- and 1 month post-operative data were available on 21 patients/29 wrists and 1 month post-operative data for 28 patients/38 wrists at the time of abstract submission. The mean pre-procedure scores were BCTQ-Symptom Score (2.47), BCTQ-Function Status (2.22), and QuickDASH (43.12). The mean 1 month post-operative data for 38 wrists were BCTQ-Symptom Score 1.39, BCTQ-Function Status 1.34 and QuickDASH 14.67.

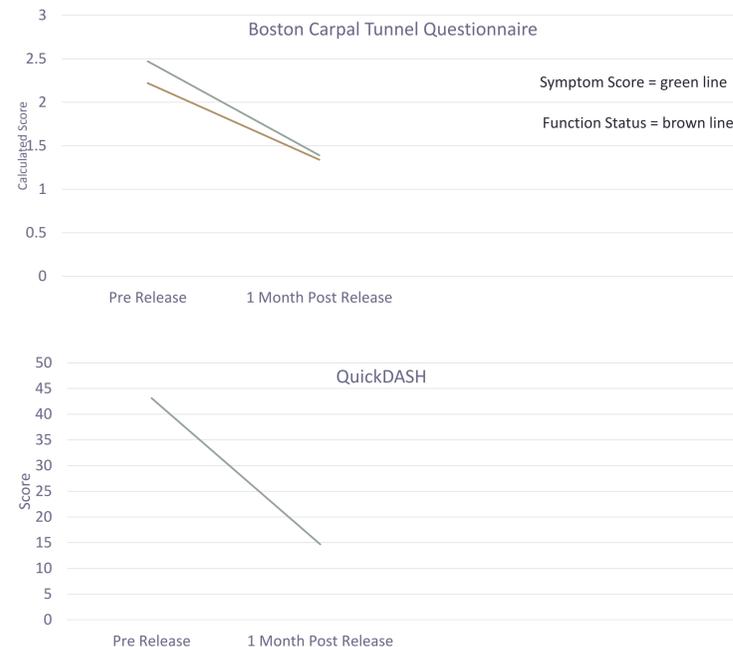
Boston Carpal Tunnel Questionnaire

	Symptom Score	Functional Status
Pre Release	2.47	2.22
1 Month Post	1.39	1.34
Difference	1.08	0.88

QUICKDASH

Pre Release	43.12
1 Month Post	14.67
Difference	28.45

RESULTS



CONCLUSIONS

- Early clinical results indicate that UGCTR using the SX-One MicroKnife can be performed safely and effectively in a variety of practice settings and may facilitate recovery following carpal tunnel release.
- Our cohorts BCTQ functional status score improved by 0.88 points, greater than the three month improvement of 0.74 needed to achieve MCID as described by Kim et al following limited open release.⁷
- Our cohorts QuickDASH score improved by 28.45 points, greater than the 20 point difference needed to reach MCID 3 months after open release.⁸
- Longer-term follow-up on this patient group is in progress and further clinical experience using the SX-One MicroKnife to perform USCTR is being accumulated.

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Figures and Videos



Figure 1. Incision site distal wrist crease. Yellow Arrow.

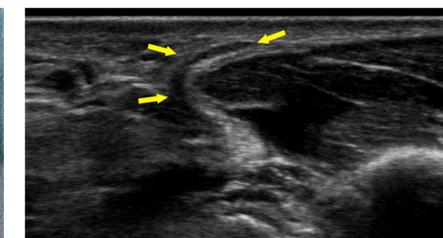


Figure 2. Thenar Motor Branch = Bounded by yellow arrows. Left = ulnar, Top = superficial

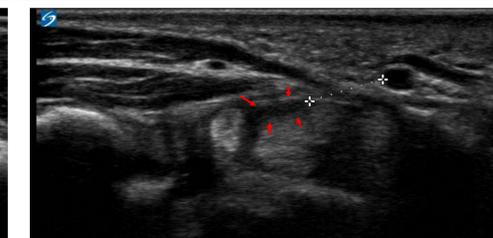


Figure 3. Transverse safe zone distal tunnel = dotted line. Median nerve bounded by red arrows. Left = radial, Top = superficial

Transverse safe zone (TSZ): bounded radially by median nerve and ulnarly by ulnar artery or hook of hamate, whichever is more radial

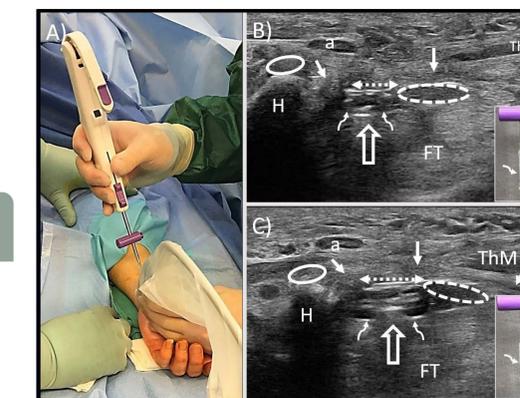


Figure 4. A. Placement of device through incision, then guided into tunnel under direct sonographic visualization. B. Device sitting in TSZ. C. Device with balloons expanded in TSZ. Dotted ellipse = median nerve. Curved arrows = balloons of device. Arrows = TCL. Open Arrow = device center, FT= flexor tendons, ThM = thenar muscle, H = hamate, a = ulnar artery, closed oval = ulnar nerve

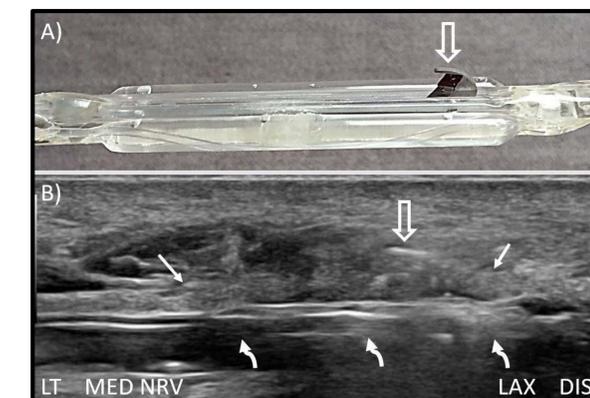
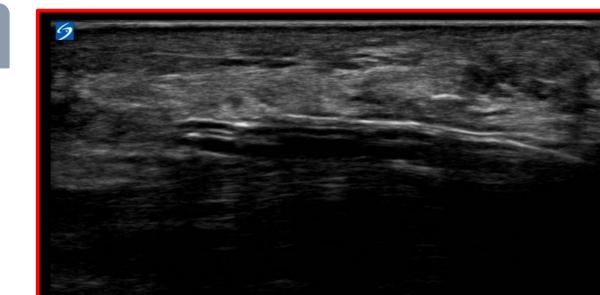


Figure 5. A. Picture of device with balloons expanded and hook knife deployed. B. Sonographic image of hook knife cutting TCL. Left = proximal, Top = superficial.



Video 1. Device transecting the TCL. Left = distal, Top = superficial.



Video 2. Post release device is sitting superficial to the boundaries of the entire length of the carpal tunnel. Left = radial, Top = superficial.