The wide awake approach to ulnar nerve entrapment: results of an integrated one stop wide awake surgical pathway

QMK Bismil1*, S Lowe2, L Viner3, MSK Bismil4

Abstract
Introduction
The wide awake approach to hand surgery is gaining increasing popularity worldwide, but PubMed search does not reveal any publications on wide awake ulnar nerve surgery. In this research study, we describe our surgical experience, techniques and results of the wide awake management of ulnar nerve entrapment at both elbow and wrist. This study is based on a background of having established the world’s first totally one stop wide awake (OSWA) hand surgery service, with published outcomes.

Materials and methods
We performed a retrospective review of our 2011/12 ulnar nerve entrapment cases, which comprised 40 patients with ulnar nerve dysfunction.

Results
The main outcome measures were sensorimotor improvement, including improvement of the QuickDASH score, patient satisfaction and cost-effectiveness and efficiency.

Discussion
No surgical complications were experienced by the patients and all of them were satisfied with their treatment. All patients were followed-up to a good outcome including objective sensorimotor improvement in ulnar nerve function.

Conclusion
The wide awake approach to ulnar nerve decompression is safe, effective and comparable to the historical approach; and is amenable to a one stop patient pathway.

Introduction
Wide awake hand surgery enables treatment in one management stop, through a patient-centric pathway, which is broadly more akin to dental treatment than a traditional multi-stop surgical approach. The one stop wide awake (OSWA) hand surgery service is now well-described in the worldwide published literature1,2. Wide awake hand surgery, is hand surgery, without general anaesthesia or regional anaesthesia or sedation or tourniquets. There have been great advances in the technique(s) for hand surgery, over the last decade. It is now over 30 years, since the first peer reviewed publications on wide awake hand surgery3, and despite inherent potential advantages (lower risk, a more convenient pathway for the patient and cost-savings for national state-funded healthcare)1,2, the worldwide transition to the technique has been slow, according to the published literature1-22. The published literature on ulnar nerve compression/decompression, reflects that there are two encouraging case series, each comprising 20 cases, which were performed using a local anaesthetic technique in 2001 and 198223,24. However, a contemporaneous search on PubMed for the relevant terms is instructive: Ulnar Nerve and Local Anaesthesia or local anaesthetic; or wide awake cubital tunnel; or wide awake ulnar tunnel; or ulnar nerve entrapment. This demonstrates that there has been little recent progress with wide awake ulnar nerve surgery as would have been expected; despite the recent advances with wide awake hand surgery. There is no previous description of an all-encompassing or totally OSWA surgical pathway for the totality of ulnar nerve entrapment, irrespective of site. The aim of this research study was to discuss the wide awake approach to ulnar nerve entrapment, which we have pioneered in the UK.

Materials and methods
All the patients in this study were managed according to the OSWA ulnar nerve entrapment pathway, with a clinical diagnosis of unilateral isolated ulnar nerve dysfunction (Figure 1).

Clinical evaluation
The conduction of clinical evaluation included the following:

- History: Sensorimotor ulnar nerve dysfunction distal was observed on the site of entrapment.
- Biro Test: Sympathetic dysfunction resulted in reduced sweating in little (ulnar nerve) versus index (median nerve) pulp biro slides more easily on affected digits.
- Scratch Collapse Test: The patient was asked to resist bilateral shoulder external rotation, with the elbows fully flexed. The area of suspected ulnar nerve compression was then lightly scratched and then resisted shoulder external rotation was immediately repeated. In ulnar nerve dysfunction, there was momentary loss of shoulder external rotation resistance on the affected side.

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Tinel's Test: The ulnar nerve irritability was reproduced by percussion over the cubital or ulnar tunnel. Surgery was performed under local anaesthesia using a lignocaine (lidocaine) and low-dose adrenaline mix, with no tourniquet. A tourniquet on the upper arm was painful for the wide awake patient and would encroach upon the surgical field for proximal operations. In our experience of wide awake surgery, meticulous dissection enabled surgery without diathermy. The standard for ulnar nerve surgery was 10 ml of 2% lignocaine, with adrenaline 1:200,000, which was drawn up, with a 21-gauge needle and infiltrated with a 25-gauge needle.

Cubital tunnel decompression technique (proximal)
The following steps were followed in this technique, also see Table 1:
1. The patient lied down in supine position.
2. Surgical marking positioning was done as depicted in Figure 2. The following were the findings observed for this surgical mark:
   a. Double sandbag was large at base, smaller on top and tucked into axilla.
   b. Shoulder abduction was at 60°.

<table>
<thead>
<tr>
<th>Table 1. Keys to successful one stop wide awake management (adapted from original OSWA paper1).</th>
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<tr>
<td><strong>No tourniquets</strong></td>
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<tr>
<td>Too painful for the patient for complex surgery.</td>
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<tr>
<td>Unnecessary.</td>
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<tr>
<td>A tourniquet for cubital tunnel syndrome interferes with access to the cubital tunnel.</td>
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<td><strong>Local anaesthetic technique:</strong></td>
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<td>2% lignocaine with adrenaline 1:200,000.</td>
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<td>Plain lignoaine for digits.</td>
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<td>Infiltrate in theatre prior to scrub to allow anaesthetic to work.</td>
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<tr>
<td><strong>Careful surgical dissection and meticulous technique</strong></td>
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<tr>
<td>Point bleeding managed with pressure from rolled small swab.</td>
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<tr>
<td>Experienced, small team with clear and defined roles</td>
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<tr>
<td>Simple health questionnaire filled up online by patient</td>
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<tr>
<td>Pre-consultation information provided at <a href="http://www.oswa.me">www.oswa.me</a></td>
</tr>
<tr>
<td>Focused consultation with thorough discussion of pros versus cons and risks versus benefits of treatment options.</td>
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<tr>
<td><strong>Compact functional outpatients and theatre space enabling easy, safe and effective patient flow.</strong></td>
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<tr>
<td>Efficient, thorough evidence-based treatment with robust audit and governance facilities/mechanisms/processes.</td>
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depicted in Figure 1. There were 40 cases of clinical ulnar nerve compression. Three injections (mild syndrome as per QuickDASH score) were administered. Thirty-seven operations (moderate to severe syndrome as per QuickDASH score) were performed, of these three operations were ulnar tunnel decompressions and 34 operations were cubital tunnel decompressions. The cubital tunnel patients’ diagnoses were made clinically and the diagnosis was confirmed with nerve conduction studies as required. The three ulnar tunnel syndrome cases were diagnosed clinically. Two of the ulnar tunnel patients previously had cubital tunnel release, with no improvement. There were no intra-operative surgical complications experience by the patients and there were no microbiologically-proven post-operative infections. In all the patients, there were significant subjective and objective improvements in ulnar nerve sensorimotor function post-surgery, including improvements in the validated QuickDASH score.

All the patients were satisfied with the OSWA treatment pathway.

Surgery was provided to the National Health Service at around 50% of tariff.

**Diagnostic tests and the OSWA ulnar nerve pathway**

The OSWA ulnar nerve pathway is depicted in Figure 1.

All patients were managed to a successful outcome through the OSWA ulnar nerve pathway, and nerve conduction studies did not affect the management. As part of the informed consent and the discussion of pros and cons and risks and benefits, all the patients were offered electrodiagnostic studies, but in this case series, these tests did not affect the management pathway in any case. All the patients who had undergone surgical treatment, showed positive Ulnar Biro, Scratch Collapse and Tinel’s tests. In the ulnar tunnel syndrome, there was irritability of the ulnar nerve in the ulnar tunnel rather than in the cubital tunnel, and sensorimotor dysfunction was distal to the site of compression.

**Discussion**

It is now generally accepted that the standard procedure for ulnar nerve entrapment proximally in the cubital tunnel is simple decompression, but more extensive surgery is also described in the literature. Distal entrapment in the ulnar tunnel is less well described, but in our experience it is not uncommon, and decompression is the standard surgical procedure. As per the recent paper by Hagert on wide awake treatment of (occult) proximal median nerve entrapment: it is our experience that distal ulnar nerve entrapment may similarly be overlooked and is not usually detected on nerve conduction studies. Moreover, in the present series all the three cases of ulnar tunnel syndrome had a false negative nerve conduction study result for ulnar tunnel entrapment; and this has confounded the diagnosis of their clinically obvious ulnar tunnel syndromes. This underlines the general recognition in the literature that electromyography is a possible adjunct to thorough clinical assessment in peripheral nerve entrapment; but that these syndrome are essentially clinical diagnoses.

In this research study, we describe a totally wide awake approach to ulnar nerve entrapment, irrespective of the site, and all management was performed in one discrete management stop. The wide awake hand surgery techniques we utilize enable enable optimisation of patient pathways. Through the wide awake approach, patients can be safely and effectively treated in one management stop and outside the main operating theatre.

A wide awake injection technique using epinephrine is now standard worldwide. A multitude of recent studies have conclusively demonstrated that a wide awake injection technique using local anaesthesia with low-dose epinephrine is safe and effective. This refutes decades of surgical dogma. The injection technique can be optimised to minimise the associated pain.

The wide awake approach enables intra-operative optimisation, and as described by Layne and Bell in the original case series of local anaesthetic surgery for cubital tunnel syndrome: the usual scenario is an immediate sensorimotor improvement on the surgical table; once the complete decompression has been performed. Feedback from the wide awake patient can therefore be used to optimise the surgery. Usually, this is the best guide to ensure that a complete decompression has been performed, but moreover, this can be a guide to fine tune the procedure with techniques, such as epineurectomy.

**Conclusion**

Wide Awake Hand Surgery (WAHS) techniques rebalance surgical risk: by eliminating the risks of general anaesthesia, regional anaesthesia, sedation and tourniquets; there is a rebalancing of risk for patients undergoing totally wide awake ulnar nerve decompression. The present audit demonstrated that a one stop wide awake (OSWA) approach to ulnar nerve entrapment is safe and effective, with high levels of patient satisfaction, and is efficient in terms of processes and cost-savings for state healthcare.

**Abbreviations list**

FCU, flexor carpi ulnaris; OSWA, one stop wide awake.

**References**


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