CQ HAND + UPPER LIMB
SPECIALIST ORTHOPAEDIC SURGEON

EVIDENCE SUMMARY

Numbness and Tingling in the Hand and Arm

Overview

- Median nerve entrapment neuropathy encompasses a spectrum of conditions, including pronator syndrome, which requires consolidated knowledge to improve patient outcomes [1].
- Clear definitions distinguishing recurrence from persistent compression neuropathy are necessary to enable comparison of results across different techniques and clinics [2].
- Agreements on supplementary diagnostics and standardized outcome measurements are needed for upper extremity revision nerve compression surgery [2].
- Diagnosis of mild-to-moderate idiopathic median neuropathy at the carpal tunnel based on signs and symptoms is discordant from diagnosis based on electrodiagnostic studies (EDS) and ultrasound (US) [3].
- There is severe discordance between the estimated prevalence of mild-to-moderate carpal tunnel syndrome based on clinical signs and symptoms (73%) versus EDS and US (51%) [12].
- This discordance calls into question whether clinicians can confidently diagnose patients with mild-to-moderate carpal tunnel syndrome based on clinical presentation alone [12].
- When signs and symptoms suggest mild-to-moderate median neuropathy and surgery is being considered, additional testing such as EDS or US may increase the probability of identifying actual median neuropathy that can benefit from surgery [3].
- Upper-extremity neuropathy can develop following nonupper extremity surgeries, particularly anterior cervical discectomy and fusion (ACDF) [4].
- Neuropathy symptoms following shoulder surgery were often refractory to conservative management [6].
- Surgical decompression for neuropathy following shoulder surgery led to nearly 90% symptom resolution [6].
- Patients with a history of ulnar nerve lesions are at a significantly increased risk of developing carpal tunnel syndrome, especially within the first 2 years [7].
- As the severity of ulnar neuropathy at the elbow increases, the cross-sectional area (CSA) of the ulnar nerve correspondingly increases at the elbow [8].
- Assessment of position and tactile sensations is important in determining participation in manual skills during neuropathy rehabilitation [5].

CQ HAND + UPPER LIMB
Dr Kieran Hirpara — Specialist Orthopaedic Surgeon
Suite 2, Level 1, Mater Private Hospital Rockhampton, 31 Ward Street, The Range, QLD 4700
Phone 07 4863 6556 · office@cqupperlimb.com.au · cqupperlimb.com.au

- Quality of life domains are impacted by distal radius fracture and ulnar neuropathy, with contextual factors influencing these implications [9].

Background & Causes

- Median nerve entrapment neuropathy includes pronator syndrome [1].
- The anconeus epitrochlearis muscle's contribution to compression neuropathy or protection of the ulnar nerve could not be discerned for the standard population [19].
- A bifid median nerve can cause entrapment by forearm musculature [10].
- The pectoralis minor's unique asymmetric neurologic innervation predisposes the human shoulder to neurologic and musculoskeletal imbalance, producing the Human Disharmony Loop syndrome [18].
- Double entrapment neuropathy of the ulnar nerve at the elbow and wrist may represent double crush syndrome [13].

Symptoms & Presentation

- There is a severe discordance between the estimated prevalence of mild-to-moderate carpal tunnel syndrome based on clinical signs and symptoms (73%) versus electrodiagnostic studies and ultrasound (51%) [12].
- If double crush syndrome is suspected but symptoms are mild, they may respond to conservative treatment [13].
- Assessment of position and tactile sensations is relevant for determining participation in manual skills in patients with upper extremity neuropathy [5].
- Assessing quality of life domains provides insight into the implications of contextual factors on quality of life for patients with distal radius fracture and ulnar neuropathy [9].

Management

- Median nerve entrapment neuropathy reviews aim to consolidate existing knowledge to improve patient outcomes [1].
- Clear definitions of recurrence versus persistent compression neuropathy are needed to enable comparison of results from different techniques and clinics [2].
- Agreements on supplementary diagnostics and standardized outcome measurements are required for comparing results across different techniques and clinics [2].
- When signs and symptoms suggest mild-to-moderate median neuropathy and surgery is being considered, additional testing such as electrodiagnostic studies (EDS) or ultrasound (US) can increase the probability of identifying actual median neuropathy that can benefit from surgery [3].

- Assessment of position and tactile sensations should not be ignored in determining participation in manual skills during neuropathy rehabilitation [5].
- Surgical decompression led to nearly 90% symptom resolution for neuropathy following shoulder surgery [6].
- Assessing quality of life (QoL) domains for upper extremity conditions provides insight into the implications of contextual factors on QoL [9].
- Surgeons should bear anomalies such as bifid median nerve entrapment by forearm musculature in mind when assessing patients with symptoms of median nerve compression [10].
- Hand abduction tracings are a quantitative outcome measure to follow recovery over time for intrinsic hand function and can be used in patients with severe ulnar neuropathy following surgical intervention [11].
- In cases of suspected double crush syndrome, invasive treatments should be initiated preferentially at sites with greater clinical suspicion [13].
- Decompressing the deep motor branch of the ulnar nerve caused by heterotopic ossification allowed for spontaneous nerve recovery and reinnervation of ulnar nerve-innervated intrinsic muscles [14].
- More than 50% of patients who did not undergo carpal tunnel release at the initial surgery for perilunate injuries required a release within the follow-up period [15].
- Anterior interosseous nerve transfer, along with cubital and ulnar tunnel release, results in sustained clinical and electrophysiological improvements in patients with severe chronic ulnar nerve compression [16].
- Anterior interosseous nerve transfer combined with cubital and ulnar tunnel release encourages adoption as a standard treatment for severe chronic ulnar nerve compression [16].
- Sensory interventions on motor function, activities of daily living, and spasticity of the upper limb in people with stroke are inexpensive, noninvasive, and easy to perform [17].
- Sensory interventions can be easily implemented into conventional therapy practice in any setting [17].

Key Considerations

- Median nerve entrapment neuropathy encompasses a spectrum of conditions, including pronator syndrome [1].
- Agreements on supplementary diagnostics and standardized outcome measurements are required for comparing results from different techniques and clinics in upper extremity revision nerve compression surgery [2].
- When signs and symptoms suggest mild-to-moderate median neuropathy and surgery is being considered, additional testing such as EDS or US increases the probability of identifying actual median neuropathy that can benefit from surgery [3].
- The severe discordance between clinical prevalence estimates (73%) and EDS/US prevalence estimates (51%) calls into question whether clinicians can confidently diagnose patients with mild-to-moderate carpal tunnel syndrome [12].

- Hand abduction tracings serve as a quantitative outcome measure to follow recovery over time for intrinsic hand function in patients with severe ulnar neuropathy following surgical intervention [11].
- Decompression of the deep motor branch of the ulnar nerve caused by heterotopic ossification allowed for spontaneous nerve recovery and reinnervation of ulnar nerve-innervated intrinsic muscles [14].
- More than 50% of patients with perilunate injuries who did not undergo carpal tunnel release at initial surgery required a release within the follow-up period [15].

Key Evidence

- [L5] By reviewing the current literature within the spectrum of median nerve entrapment neuropathies, this review aimed to enhance and summarize the current understanding by consolidating the existing knowledge for improved patient outcomes. [1] (10.1016/j.xrrt.2024.10.001)
- [L5] The authors emphasize the need for clear definitions of recurrence versus persistent compression neuropathy, agreements on supplementary diagnostics, and standardized outcome measurements to enable comparing results from different techniques and clinics. [2] (10.1177/17531934241311822)
- [L3] When signs and symptoms suggest mild-to-moderate median neuropathy and surgery is being considered, patients and clinicians might consider additional testing, such as EDS or US, to increase the probability of actual median neuropathy that can benefit from surgery. [3] (10.1097/corr.0000000000002751)
- [L3] Upper-extremity neuropathy can develop following nonupper extremity surgeries, particularly ACDF. [4] (10.1016/j.jhsg.2026.100972)
- [L3] In neuropathy rehabilitation, the assessment of position and tactile sensations should not be ignored in determining participation in manual skills. [5] (10.1016/j.jht.2024.12.005)
- [L4] Neuropathy symptoms were often refractory to conservative management, while surgical decompression led to nearly 90% symptom resolution. [6] (10.1016/j.jseint.2024.05.011)
- [L2] Patients with a history of ulnar nerve lesions are at a significantly increased risk of developing carpal tunnel syndrome, especially within the first 2 years. [7] (10.1016/j.jhsg.2026.100970)
- [L2] As the severity of ulnar neuropathy at the elbow increases, the CSA of the ulnar nerve correspondingly increases at the elbow. [8] (10.1016/j.jhsa.2024.12.004)
- [L3] Assessing QoL domains for two upper extremity conditions with different contextual factors provides insight into the implications of those factors on QoL. [9] (10.1016/j.jht.2024.11.006)
- [L5] We encourage surgeons to bear such anomalies in mind when assessing patients with symptoms of median nerve compression. [10] (10.1177/17531934251401431)
- [L4] Hand abduction tracings are a quantitative outcome measure to follow recovery over time for intrinsic hand function and can be used in patients with severe ulnar neuropathy following surgical intervention. [11] (10.1016/j.jht.2023.09.005)
- [L5] There is a severe discordance between the estimated prevalence of mild-to-moderate carpal tunnel syndrome based on clinical signs and symptoms (73%) versus electrodiagnostic studies and ultrasound

(51%), calling into question whether clinicians can confidently diagnose patients with mild-to-moderate CTS. [12] (10.1097/corr.0000000000002822)

- [L4] If double crush syndrome is suspected but symptoms are mild, they may respond to conservative treatment, while invasive treatments should be initiated preferentially at sites with greater clinical suspicion. [13] (10.1186/s12891-024-07574-z)
- [L4] Decompressing the patient's deep motor branch of the ulnar nerve allowed for spontaneous nerve recovery and reinnervation of his ulnar nerve innervated intrinsic muscles. [14] (10.1016/j.jhsg.2024.02.001)
- [L3] More than 50% of patients who did not undergo carpal tunnel release at the initial surgery required a release within the follow-up period. [15] (10.1016/j.jhsg.2023.09.003)
- [L4] Anterior interosseous nerve transfer, along with cubital and ulnar tunnel release, results in sustained clinical and electrophysiological improvements in patients with severe chronic ulnar nerve compression, which encourages its adoption as a standard treatment for severe chronic ulnar nerve compression. [16] (10.1177/17531934251381023)
- [L2] These interventions are inexpensive, noninvasive, and easy to perform, so can be easily implemented into conventional therapy practice in any setting. [17] (10.1016/j.jht.2024.08.051)
- [L4] The unique asymmetric neurologic innervation to the pectoralis minor predisposes the human shoulder to neurologic and musculoskeletal imbalance, producing the Human Disharmony Loop syndrome. [18] (10.3390/jcm14051769)
- [L3] The contribution of the anconeus epitrochlearis to compression neuropathy or protection of the ulnar nerve could not be discerned for the standard population. [19] (10.1016/j.jse.2024.09.039)

References

[1] Median nerve entrapment neuropathy: a review on the pronator syndrome. *JSES Reviews, Reports, and Techniques*. 2025. DOI: 10.1016/j.xrrt.2024.10.001

[2] Re: van der Heijden EPA, Dailiana ZH, Giele HP. State of the art review. Upper extremity revision nerve compression surgery. J Hand Surg Eur. 2024, 49: 687–97. *Journal of Hand Surgery (European Volume)*. 2025. DOI: 10.1177/17531934241311822

[3] Diagnosis of Mild-to-moderate Idiopathic Median Neuropathy at the Carpal Tunnel Based on Signs and Symptoms is Discordant From Diagnosis Based on Electrodiagnostic Studies and Ultrasound. *Clinical Orthopaedics & Related Research*. 2023. DOI: 10.1097/corr.0000000000002751

[4] Incidence of Median and Ulnar Neuropathy Following Nonupper Extremity Surgery. *Journal of Hand Surgery Global Online*. 2026. DOI: 10.1016/j.jhsg.2026.100972

[5] The effect of wrist position sense and tactile recognition on manual skills in patients with upper extremity neuropathy. *Journal of Hand Therapy*. 2025. DOI: 10.1016/j.jht.2024.12.005

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Phone 07 4863 6556 · office@cqupperlimb.com.au · cqupperlimb.com.au

[6] The incidence and decompression rates of median and ulnar neuropathies following shoulder surgery. *JSES International*. 2024. DOI: 10.1016/j.jseint.2024.05.011

[7] Incidence of Carpal Tunnel Syndrome After the Diagnosis of Ulnar Neuropathy. *Journal of Hand Surgery Global Online*. 2026. DOI: 10.1016/j.jhsg.2026.100970

[8] Association of Ultrasound and Electrodiagnostic Studies in Patients Evaluated for Ulnar Neuropathy. *The Journal of Hand Surgery*. 2025. DOI: 10.1016/j.jhsa.2024.12.004

[9] A retrospective analysis of quality of life domains impacted by distal radius fracture and ulnar neuropathy. *Journal of Hand Therapy*. 2025. DOI: 10.1016/j.jht.2024.11.006

[10] Bifid median nerve entrapment by forearm musculature – a case report and systematic literature review. *Journal of Hand Surgery (European Volume)*. 2025. DOI: 10.1177/17531934251401431

[11] The hand diagram: A novel outcome measure following supercharged end-to-side anterior interosseous nerve to ulnar nerve transfer in severe compressive ulnar neuropathy. *Journal of Hand Therapy*. 2024. DOI: 10.1016/j.jht.2023.09.005

[12] CORR Insights®: Diagnosis of Mild-to-moderate Idiopathic Median Neuropathy at the Carpal Tunnel Based on Signs and Symptoms is Discordant From Diagnosis Based on Electrodiagnostic Studies and Ultrasound. *Clinical Orthopaedics & Related Research*. 2023. DOI: 10.1097/corr.0000000000002822

[13] Double entrapment neuropathy of the ulnar nerve at the elbow and the wrist : double crush syndrome?. *BMC Musculoskeletal Disorders*. 2024. DOI: 10.1186/s12891-024-07574-z

[14] Posttraumatic Compressive Neuropathy of the Deep Motor Branch of the Ulnar Nerve Caused by Heterotopic Ossification. *Journal of Hand Surgery Global Online*. 2024. DOI: 10.1016/j.jhsg.2024.02.001

[15] Predicting Acute Median Neuropathy in Perilunate Injuries. *Journal of Hand Surgery Global Online*. 2024. DOI: 10.1016/j.jhsg.2023.09.003

[16] Anterior interosseous nerve transfer combined with cubital and ulnar tunnel release for severe ulnar nerve compression. *Journal of Hand Surgery (European Volume)*. 2025. DOI: 10.1177/17531934251381023

[17] CRITICAL APPRAISAL PAPER: "SENSORY INTERVENTIONS ON MOTOR FUNCTION, ACTIVITIES OF DAILY LIVING, AND SPASTICITY OF THE UPPER LIMB IN PEOPLE WITH STROKE: A RANDOMIZED CLINICAL TRIAL". *Journal of Hand Therapy*. 2025. DOI: 10.1016/j.jht.2024.08.051

[18] The Human Disharmony Loop: A Case Series Proposing the Unique Role of the Pectoralis Minor in a Unifying Syndrome of Chronic Pain, Neuropathy, and Weakness. *Journal of Clinical Medicine*. 2025. DOI: 10.3390/jcm14051769

[19] Is the anconeus epitrochlearis muscle a predictor for ulnar nerve compression?. *Journal of Shoulder and Elbow Surgery*. 2025. DOI: 10.1016/j.jse.2024.09.039

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