

Cubital Tunnel Syndrome Presenting With Carpal Tunnel Symptoms: Clinical Evidence for Sensory Ulnar-to-Median Nerve Communication

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Interneural communications in the upper extremity have been described in various schemes. They have remained, however, the subject of diagnostic, anatomical, and neurophysiologic interest and have seldom related directly to clinical decision making.

In this report, we describe the case of a patient who, despite typical clinical complaints of carpal tunnel syndrome, did not manifest any of the clinical signs of median nerve compression. She showed evidence of ulnar nerve compression at the elbow, and provocative testing of the cubital tunnel reproduced the “carpal tunnel” symptomatology. Awareness of the presence of ulnar-to-median nerve communication led to the correct yet counterintuitive decision to perform cubital tunnel release. The authors have obtained the patient’s written informed consent for print and electronic publication of the case report.

CASE REPORT

A right-hand–dominant woman in her mid-30s was referred for evaluation of numbness and tingling in the right hand that started 7 years before presentation. The symptoms mainly involved the thumb and index finger and had worsened over the previous few months. They often awakened her at night. She had tried several anti-inflammatory drugs but obtained no relief. Occasionally, she had similar symptoms in the left hand. She denied any prior history of trauma.

Physical examination revealed full, painless range of motion of the wrist and all digits and no signs of tenosy-

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novitis or arthritis. The Tinel sign, the Phalen test, and the Durkan test were all negative over the median nerve at the wrist. Thenar and hypothenar muscles showed no atrophy and were of normal power.

Examination of the right elbow revealed a positive Tinel sign over the ulnar nerve with radiation into the thumb and index fingers—reproducing the symptoms. The ulnar nerve was short and subluxing. The rest of the elbow examination was unrevealing. No signs of nerve entrapment were found on the contralateral side.

“Depending solely on history and not performing a proper physical examination could easily have led to a false diagnosis of carpal tunnel syndrome...”

Radiographic evaluation of the elbow and wrist revealed no bone or soft-tissue abnormalities. Electrodiagnostic studies revealed mild ulnar nerve neuropathy at the level of the elbow but were otherwise unremarkable. Specifically, motor nerve conduction studies showed normal median nerve parameters. The ulnar nerve showed normal distal latency and amplitude, but the velocity was delayed across the elbow. Sensory nerve conduction studies revealed normal distal latencies of all nerves but reduced ulnar nerve amplitude. F-wave studies of the median and ulnar nerves, and electromyographic studies of the brachioradialis, flexor carpi radialis, extensor digitorum communis, first dorsal interosseous, and abductor pollicis brevis were all normal. There were no obvious clues as to the presence of aberrant nerve communication.

When ulnar-to-median nerve communication was clinically suspected, the patient was counseled about the nature of compression neuropathies and about the fact that her “median nerve” symptoms in the absence of both clinical and electrodiagnostic median nerve findings, together with the presence of ulnar nerve compression findings at the level of the elbow, made this an atypical or bizarre presentation of cubital tunnel syndrome. The patient consented to ulnar nerve anterior subcutaneous transposition.

During surgery, evidence of mechanical irritation and scarring over and thickening of the ulnar nerve were found. No other pathologic findings were recognized. The nerve was released and transposed anteriorly.

Recovery was gradual. By 6 to 8 weeks after surgery, the patient had recovered completely, and the presenting symptoms had abated. By 6-month follow-up, the patient had returned to her previous level of activity, with complete resolution of the presenting complaints.

LITERATURE REVIEW

Martin-Gruber communication, or median-to-ulnar nerve communication in the forearm, is not uncommon. Mean incidence is 20%, but incidence has been reported to be as high as 54%.¹⁻⁷ This communication may be bilateral in up to 73.6% of cases.⁴ Although well known to many, it is not the only form of interneural communication in the upper extremity.^{8,9} It can even coexist with other communications.^{10,11}

Ulnar-to-median nerve communication is not well known. In the forearm, it is called *Marinacci syndrome*. This was first described by Marinacci^{12,13} when a patient with a forearm traumatic lesion of the median nerve showed preservation of the thenar muscles innervation both clinically and electrodiagnostically. Marinacci concluded that the ulnar nerve supplied the median nerve-innervated muscles in an “all-ulnar hand.” Since then, there have been only a few case reports of such communication, based mostly on incidental electrodiagnostic findings.¹⁴ Ulnar-to-median nerve communications in the forearm are mostly motor, but at least 1 pure sensory communication has been reported.^{14,15} Of all the cases described, only 1 was demonstrated on surgical exploration.¹⁶

Ulnar-to-median nerve communication in the palm has been described in at least 2 forms. Riches-Cannieu communication is a deep, motor communication.¹⁷ It is similarly recognized when a patient presents with a lesion of the median nerve in the forearm but still shows some median nerve function. This can be erroneously interpreted as partial lesion of the median.¹⁸ The *Berrettini branch*, or superficial ulnar-to-median nerve communication in the palm, is a pure sensory communication that is present in up to 81% of cases. Its injury during carpal tunnel release results in alteration of middle and ring finger sensibility.^{19,20} To date, no pure sensory communication has been identified to provide sensibility to the “median nerve territory” via the ulnar nerve.

Several electrodiagnostic clues can lead to identification of ulnar-to-median nerve communication.^{21,22} These clues, however, are not conclusive, especially for the less experienced neurophysiologist, who might not recognize the unusual findings. On the other hand, technical errors might generate values that could simulate a nonexistent communication.^{14,22} This has led some authors to question the credibility of previous reports that showed an unusually high prevalence.⁶

When an ulnar-to-median nerve communication was clinically suspected in the present case, the patient was counseled about the nature of compression neuropathies

and about the fact that the presence of “median nerve” symptoms in the absence of both clinical and electrodiagnostic median nerve findings, together with the presence of findings suggestive of ulnar nerve compression at the elbow, made this an extremely unusual and atypical presentation of cubital tunnel syndrome. Depending solely on history and not performing a proper physical examination could easily have led to a false diagnosis of carpal tunnel syndrome, to unindicated and unnecessary carpal tunnel decompression, and to failure to cure the patient’s symptoms. Reproduction of the symptoms in the first 2 digits on performing the Tinel test over the ulnar nerve at the elbow provided conclusive, self-sufficient evidence for a sensory ulnar-to-median nerve communication distal to the elbow, despite the lack of supporting evidence on electrodiagnostic evaluation.

Although the various neural variations seem to be more of anatomical, phylogenetic, and neurophysiologic interest rather than immediately clinical, knowledge of such variations can prove very useful in surgical decision making. Our literature review disclosed at least 2 reports in which electrophysiologically proven neural communications compounded the corresponding clinical scenarios in a surgical setting.^{23,24} The proper surgical intervention was successfully undertaken based on the meticulous preoperative investigation. The importance of this knowledge has also been established in the case of the *Berrettini* branches, as they are especially at risk in endoscopic carpal tunnel release.^{19,20}

CONCLUSIONS

Although uncommon, neural communications in the upper extremity should always be kept in mind. A thorough clinical examination of the peripheral nerves is very important and should be completed with electrodiagnostic studies. Unusual presentations or discrepancies between the history and the physical examination should be considered clues to such entities, and suspicions should be communicated to the electrophysiologist, who should look specifically for a recognizable pattern of variations.

AUTHORS’ DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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