

# Results of Treatment of Carpal Tunnel Syndrome With Associated Hourglass Deformity of the Median Nerve

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Two hundred twenty-seven successive cases of carpal tunnel syndrome confirmed by abnormal electrodiagnostic studies were reviewed. All cases underwent open carpal tunnel release by a single surgeon over a 3-year period. Thirty-two hands (14% of all cases) in 29 patients demonstrated an hourglass deformity at the time of surgery. Electrodiagnostic tests revealed no evidence of any other type of peripheral neuropathy in any patient. Postoperative electrodiagnostic studies were obtained in all cases on completion of therapy. The length of the follow-up period averaged 11 months (range, 3–35 months). The duration of preoperative symptoms ranged from 2 years to more than 10 years. Twenty-eight of the 32 hands (88%) with hourglass deformities demonstrated subjective clinical improvement or complete resolution of symptoms. Chronicity of symptoms and electrophysiologic severity did not correlate with the presence of the hourglass deformity. Presence of hourglass compression of the median nerve in carpal tunnel syndrome is therefore not a negative prognostic indicator. (J Hand Surg 1999;24A:1192–1195. Copyright © 1999 by the American Society for Surgery of the Hand.)

**Key words:** Hourglass deformity, carpal tunnel syndrome, median nerve.

A common finding during open carpal tunnel release is a small segment of flattening of the median nerve beneath the transverse carpal ligament. This has been commonly referred to as an hourglass deformity because of the appearance of the thin, flattened segment between 2 relatively swollen segments, resembling an hourglass (Fig. 1). Such flattening of the nerve is considered to be consistent

with compression. Sustained pressure on a nerve causes epineurial fibrosis with deformity and intraneural scarring, segmental hyperemia, compressive flattening, hourglass constriction, epineurial scarring, and frank nerve ischemia.<sup>1</sup> A literature search revealed that this hourglass deformity, although a common finding at the time of surgery, has never been directly studied, and its impact on clinical outcome is unknown. Therefore, a retrospective case study was undertaken to determine the prognostic significance of the hourglass deformity in carpal tunnel syndrome.

## Materials and Methods

Two hundred twenty-seven successive cases of carpal tunnel syndrome, all documented by abnormal preoperative electrodiagnostic studies, were reviewed. All cases underwent open carpal tunnel release over a 3-year period, which was performed by

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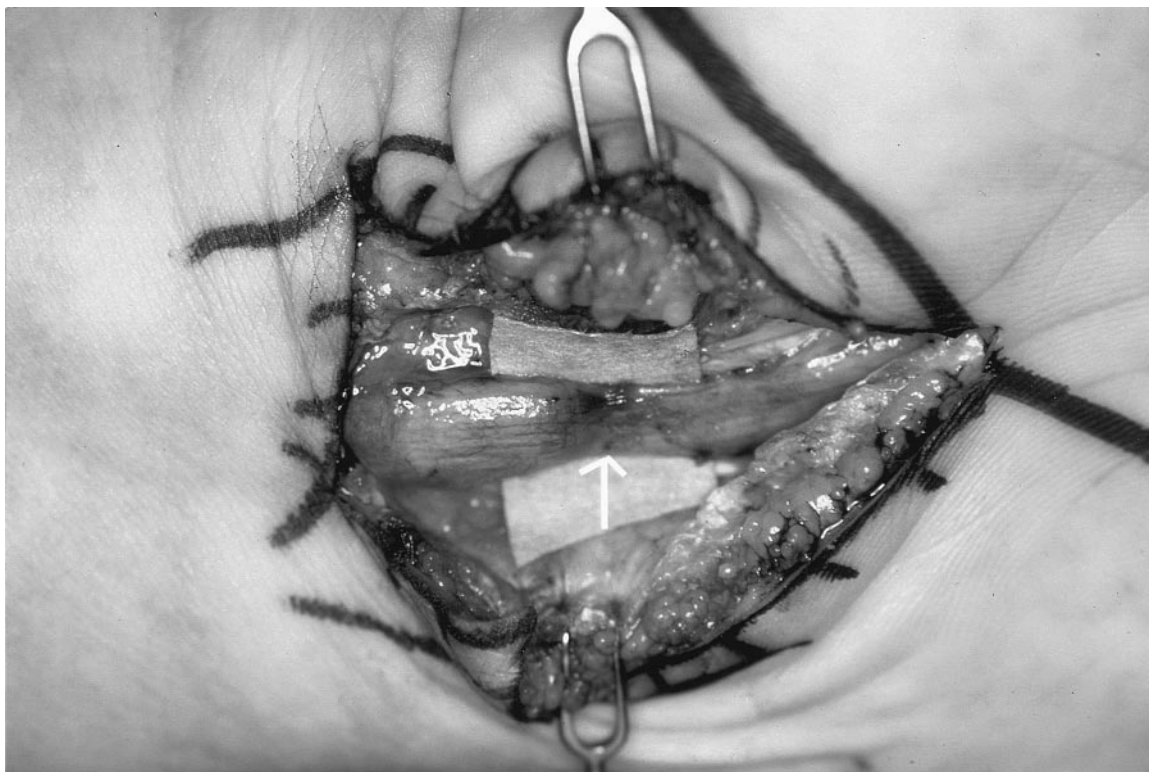
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**Figure 1.** Hourglass compression deformity of the median nerve (arrow) found during open carpal tunnel release.

the senior author (M.S.A.). Thirty-two hands (14% of all cases) in 29 patients were noted to demonstrate an hourglass deformity, which was defined as visible narrowing of the median nerve by at least 10% of the width. There were 21 female patients and 8 male patients. Two patients (3 hands) had diabetes mellitus and 2 patients (3 hands) had hypothyroidism. Preoperative electrodiagnostic tests consistently revealed only focal compressive neuropathy in all patients; no patient had evidence of peripheral neuropathy or radiculopathy. The diagnosis of carpal tunnel syndrome was based on the patient's history and physical examination in addition to abnormal electrical studies. All patients were treated conservatively before surgery for at least 3 months in new patients and, in some cases, for many years in those who were referred. Such treatment included splinting, rest, job modification when possible, anti-inflammatory agents, and often occupational therapy. Subjective improvement, Tinel's sign, Phalen's test, median nerve compression test, presence of atrophy, 2-point discrimination, and preoperative and postoperative electrodiagnostic testing were the criteria that were evaluated before and after surgery in all patients. Postoperative electrodiagnostic studies were

obtained in all cases at the final follow-up visit, which was usually within 6 months.

## Results

Twenty-eight of the 32 hands (88%) with hourglass deformities demonstrated subjective clinical improvement or complete resolution of symptoms; 2 were unchanged, 1 developed a complication of reflex sympathetic dystrophy, and 1 was lost to follow-up evaluation. The length of the follow-up period averaged 11 months (range, 3–35 months), with the shortest follow-up period being in a patient who subjectively improved so dramatically that he refused to return to the office after the second postoperative visit. The average age of onset of symptoms was 50 years (range, 21–85 years). The duration of symptoms ranged from 2 years to more than 10 years.

On preoperative electrodiagnostic testing, distal latencies were unobtainable in 5 hands (16%). Electromyography revealed evidence of denervation in 12 cases (38%). Following surgery, the average distal sensory latency improved from an average of 5.28 milliseconds before surgery to an average of 3.6

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