

Suction Decompression of the Carpal Tunnel

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Carpal tunnel syndrome (CTS) is a common nerve compression syndrome that includes symptoms of numbness and tingling in the median nerve distribution. Medical cupping therapy has been used for managing a variety of medical conditions, but, to the author's knowledge, the cupping device has not been directly applied over the carpal tunnel as a form of treatment. This case report involves a 27-year-old woman who presented with symptoms of CTS in the right hand and palpatory restriction over the right carpal canal. Electrodiagnostic testing confirmed mild CTS, and neuromuscular ultrasonography revealed a mildly enlarged median nerve at the wrist, which was also consistent with CTS. The patient was taught to use a cupping device that would allow her to apply suction over the ventral wrist daily. The patient noted improvement over several weeks and was asymptomatic at her 3-month follow-up visit. Repeated testing revealed that initial abnormalities in the wrist had resolved. Suction decompression of the carpal tunnel may be a viable alternative treatment for patients with mild CTS.

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Carpal tunnel syndrome (CTS) is widely recognized as the most common nerve compression syndrome.¹⁻³ Although there are several known causes of CTS,⁴⁻¹⁰ the pathomechanics involved at the wrist have been more thoroughly elucidated over the past decade.¹¹⁻¹³ These studies¹¹⁻¹³ have proposed a multifactorial mechanism involving the following 6 aspects: (1) increased intracarpal pressure, which compresses the median nerve; (2) decreased median nerve mobility due to relative fibrous fixation as a result of chronic inflammation and edema; (3) median nerve deformation from compression, traction, or stretching; (4) increased stiffness of the synovium and flexor retinaculum (transverse carpal ligament [TCL]); (5) thenar muscle hypertrophy or increased muscle mass, which intrudes into the carpal tunnel during hand activity at the same time the flexor tendons are tightening, thus compressing the median nerve in between the muscle ventrally and tendons dorsally; and (6) flexor tendon thickening due to chronic inflammation, edema, and fibrous changes in the tendon sheaths.¹¹⁻¹³ Consequently, treatment directed at any of these contributing factors in patients with CTS could potentially lead to some degree of improvement. Typically, patients with CTS have limited choices among standard nonsurgical treatments or the more invasive surgical release.⁴⁻⁶ This case involves a novel and simple nonsurgical approach that may address mechanisms 1 and 4 (intracarpal pressure and stiffness in the TCL). The theory involves use of a suction device to apply negative pressure directly over the carpal

tunnel to decrease intracarpal pressure, which would alleviate median nerve compression. Medical cupping has been used for other conditions and in patients with CTS, but, to my knowledge, the suction has not been previously applied directly over the carpal tunnel to achieve the desired effects as described in the present report.^{14,15}

Report of Case

A 27-year-old woman presented with progressive numbness and tingling in the thumb, index finger, and middle finger in the right hand over the prior 6 to 8 months. The numbness and tingling were worse at night and in the morning upon awakening. Physical examination results were unremarkable except for a palpatory restriction over the right carpal canal, a positive Tinel test over the right ventral wrist, and a positive Phalen test on the right. Palpatory assessment was measured using the thumbs over the ventral wrist during transverse carpal extension and thenar abduction/extension and recorded on a scale of 0 to 5 (0 being no restriction and 5 being no motion), where 2 or greater represents significant abnormality.¹⁰ The initial restriction was graded at a level 3.

Electrodiagnostic testing for the nerve conduction study (Table) revealed mildly prolonged right median distal motor, sensory, and mixed nerve latencies, consistent with mild median neuropathy at the wrist, or CTS. Neuromuscular ultrasonography (NMUS) (Figure 1A) was used to measure the cross-sectional area of the right median nerve according to the common technique on transverse imaging at the wrist and at the level of the pisiform by tracing along the inner edge of the hyperechoic (brighter) rim that surrounds the nerve (epineurium).¹¹⁻¹³ The patient's cross-sectional area was mildly increased at 13 mm² (abnormal, ≥ 12 mm²).

The patient was instructed in self-administration of vacuum suction over the ventral wrist at the region of the carpal tunnel, distal to the wrist crease, by using a plastic cupping apparatus. She was instructed to apply

Table.
Nerve Conduction Study and Ultrasonography Findings Before and 3 Months After Suction Decompression of the Carpal Tunnel^a

Variable	Normal	Initial Visit	Follow-up Visit
Median DML, ms	<1.0 - <4.4 ^b	3.4	2.8
Median DSL, ms	<3.0	3.0	2.5
Median mixed nerve latency, ms	<2.3	2.3	2.1
CSA of median nerve, mm ²	<12	13	11

^a All neurodiagnostic testing was performed using a Natus Neuromax 1002 machine. All ultrasound measurements were obtained using Terason USmart 3200 machine.

^b A normal median distal motor latency (DML) is either <4.4 or, if measuring the difference from the ipsilateral ulnar DML as in this case, <1.0.

Abbreviations: CSA, cross-sectional area; DSL, distal sensory latency.

the suction using a mid-sized cup (3.4 cm inner diameter, 4.4 cm outer diameter), using enough pressure to create a seal against the skin, at least once daily for 3 to 5 minutes at each session. The skin and subcutaneous tissue should be pulled up into the vacuum tube several millimeters with slight discoloration (Figure 2), but not to a more extreme level or to the point of moderate-marked discoloration. She was advised to be cautious to avoid excessive suction force that would cause visible damage to the skin, such as ecchymosis or bruising.

The patient returned 3 months later and noted improvement in her symptoms within the first week and that the symptoms progressively decreased with complete resolution of symptoms after 6 to 8 weeks. She had decreased the frequency of self-treatments from daily to 3 to 4 times per week. She did not maintain a log of the exact number of sessions or the duration of each session. During this time, she did not have any changes in her general medical status, and there were no changes to her work or home activities that might have led to a natural resolution of symptoms.

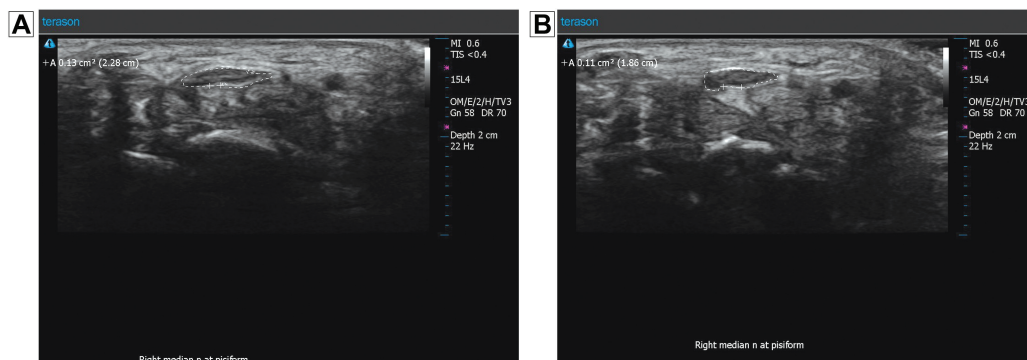


Figure 1.

Ultrasonographic images of the carpal tunnel with median nerve cross-sectional area (A) before suction decompression treatment (13 mm²) and (B) after suction decompression treatment (11 mm²) in a patient with carpal tunnel syndrome.

No other treatment was used for her CTS. Physical examination findings were normal, with resolution of palpatory restriction that was initially noted over the right carpal canal (decreased to a level 1 out of 5); both Tinel and Phalen tests were negative. The repeated nerve conduction study revealed that all median distal latencies had decreased into the normal ranges (Table). Repeated NMUS revealed that the cross-sectional area of the median nerve decreased into the normal range (Table and Figure 1B), from 13 mm² to 11 mm².

Discussion

Carpal tunnel syndrome has been described as “a macrocosmic representation of somatic dysfunction,” with a large compressed peripheral nerve, motion restriction in a peripheral joint (wrist), myofascial involvement of the thenar muscles attaching to the TCL, and circulatory effects on the small veins supplying the flexor synovialis (relative venostasis and congestion).¹⁰ As such, palpatory restriction detected in this patient confirms the osteopathic component and can be useful to objectively monitor treatment effects.¹⁰ Although this patient did not receive osteopathic manipulative treatment (OMT), any treatment that alleviates or reduces the mechanical restriction

over the carpal tunnel could be confirmed by a reduction in somatic dysfunction.

Cupping therapy with suction devices has been used for decades to treat patients with a variety of ailments and medical conditions, but not specifically CTS.¹⁵ One study¹⁴ used cupping in patients with CTS, but the suction device was applied to the shoulder girdle region (trapezius). Although some improvement was noted (primarily in symptoms) at 7 days after a



Figure 2.

Suction decompression of the carpal tunnel (demonstrated by the author on himself). Note that the device is applying negative pressure directly over the carpal tunnel, as evidenced by the overlying skin and subcutaneous tissue being partially drawn up into the suction chamber.

single treatment session, no nerve conduction studies were performed to confirm the diagnosis.¹⁴ To my knowledge, Bell palsy is the only other peripheral nerve condition that has been managed with cupping.¹⁵ Although some improvement was noted, the study¹⁵ was considered of low quality and high bias. However, the use of cupping combined with other treatments (such as acupuncture or medications) often showed significant improvements over other treatments alone.¹⁵

In the present case, no other treatments, not even wrist bracing at night, were provided. The therapeutic application of a cupping device in this patient was used to create suction to the ventral surface of the carpal tunnel to apply vertical traction along the TCL. Sufficient negative pressure was created in the cup while the device was applied externally (over the carpal tunnel) for several minutes at each session. The negative pressure would have the effect of applying stretching forces to the TCL, thereby elongating the structure that overlies the median nerve. The relative “loosening” of the TCL should affect 2 of the causative mechanisms mentioned earlier: (1) increased intracarpal pressure, compressing the median nerve; and (2) increased stiffness of the synovium and flexor retinaculum (TCL).¹¹⁻¹³ The resulting decrease in symptoms, along with improved nerve conduction study and NMUS findings, all may provide supportive evidence of such effects. In addition, there was a decrease in palpatory restriction detected over the carpal canal, which is consistent with prior work that demonstrated similar changes after OMT.¹⁰ Palpatory changes are known to precede clinical and electrophysiologic improvement and can be used to monitor progress in patients with CTS.¹⁰

In addition, there may be other factors at work. Prior research has demonstrated abnormal contractile cells (myofibroblasts) in the TCL of patients with CTS, suggesting that the ligament was in a constant state of contraction.¹⁶ The application of mechanical traction to the tissue with suction could decrease the contractile activity of these myofibroblasts, which would thereby

prevent the TCL from foreshortening and further enhance the effect of median nerve decompression.^{11,12} The changes that generate stretching forces to the TCL and inhibit contractile activity in the TCL to create loosening of the tissue over the carpal tunnel could lead to a decrease in the mechanical restriction over the carpal canal.

The decrease in mechanical restriction in the present case was initially detected on palpation, which subsequently resolved after treatment. This finding is consistent with a study that included palpatory assessment over the carpal tunnel before and after treatment with OMT.¹⁰ The OMT was credited with leading to improvement in symptoms and accompanying resolution of electrical abnormalities in patients with CTS.¹⁰ The patient in the present case experienced similar improvements without the application of OMT.

This new unproven treatment prescribed for 1 patient could reflect a spontaneous resolution of nerve compression and symptoms that were unrelated to use of the suction device. In addition, the patient did not maintain a detailed log of symptoms and precise frequency or duration of self-treatment sessions, which makes it more challenging to duplicate the therapy. After submission of this article, I treated 3 other patients with mild CTS using suction decompression and found improved or resolved symptoms. However, long-term studies with a large number of participants are necessary to further corroborate the effectiveness of suction decompression for CTS, including in patients with varying degrees of CTS severity.

Conclusion

Suction decompression of the carpal tunnel may provide a viable alternative treatment option for patients with mild CTS. It has the added benefit of being self-administered, which puts the patient in charge of his or her own treatment and outcome. Precautions are recommended to limit the time of use and the degree of suction induced, and particularly to closely observe the skin at the application site to avoid tissue damage

from excess suction. Further studies are recommended with a large number of patients and with varying degrees of CTS severity. Suction decompression may also be a valuable adjunct to use in conjunction with other routine treatments for patients with CTS, such as wrist orthoses, stretching exercises, OMT, activity modification, topical anti-inflammatory medication, and steroid injections.

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