

FACT SHEET

The effect of shockwave on carpal tunnel syndrome

INTRODUCTION

The prevalence is about 5% in the adult population. Carpal tunnel syndrome is more common in women than men, most commonly seen in women over 45 years of age, and the prevalence increases with increasing age. It's the most frequently occurring peripheral neuropathy. More than 70 % have bilateral symptoms (1)

Etiology and pathogenesis

The cause is difficult to determine in most cases, but there is often a non-specific tenosynovitis in the carpal tunnel

Secondary causes

Ganglia, neoplasms, hypertrophic synovial tissue, callus from fracture, osteophytes, congenital anomalies where the muscle belly of the superficial tendons goes all the way down into the carpal tunnel, persistent median artery.

Metabolic or physiological causes: pregnancy, myoedema, rheumatoid arthritis, infectious causes and neuropathies, diabetes mellitus, alcoholism, hereditary conditions

METHOD

Studies have been searched for and selected in the following way:

extracorporeal AND shock AND wave OR ESWT OR shockwave AND carpal AND syndrome søgt første gang Maj 2023, gentaget den 3/8/ 2023.

7 results (see reference section)

3 excluded: review, articles on other treatment

4 to be downloaded for abstract reading

4 meta-analyses from 2019, 2020, 2022, 2022

1 excluded: 2019

4 Downloadable for full text reading

Chen KT, Chen YP, Kuo YJ, Chiang MH. Extracorporeal Shock Wave Therapy Provides Limited Therapeutic Effects on Carpal Tunnel Syndrome: A Systematic Review and Meta-Analysis. *Medicina (Kaunas)*. 2022 May 19; 58(5):677. (2)

Kim, J. C., Jung, S. H., Lee, S. U., & Lee, S. Y. (2019). Effect of extracorporeal shockwave therapy on carpal tunnel syndrome: A systematic review and meta-analysis of randomized controlled trials. *Medicine*, 98(33), e16870. (3)

Li, W., Dong, C., Wei, H., Xiong, Z., Zhang, L., Zhou, J., Wang, Y., Song, J., & Tan, M. (2020). Extracorporeal shock wave therapy versus local corticosteroid injection for the treatment of carpal tunnel syndrome: a meta-analysis. *Journal of orthopaedic surgery and research*, 15(1), 556. (4)

Xie, Y., Zhang, C., Liang, B., Wang, J., Wang, L., Wan, T., Xu, F., & Lei, L. (2022). Effects of shock wave therapy in patients with carpal tunnel syndrome: a systematic review and meta-analysis. *Disability and rehabilitation*, 44(2), 177–188.(5)

When reviewing these 4 meta-analyses, Xie et al.(5) The studies are included for the other 3 meta-analyses, whereas the 3 analyses others have not included all studies, therefore this one study is chosen for review.

RESULTS

Below is an overview of the methods and effects of the included studies.

| Xie et al. | | | |
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| 10 studios included 433 participants 501 wrists 6 rESWT 4 fESWT | The treatment effect has been measured: Baseline, 1,4 and 12 weeks Baseline, 3,9 and 12 weeks Baseline, 4,10 and 14 weeks Baseline, 1,4,8 and 12 weeks Baseline, 3, 8, and 12 weeks Baseline, 1,4,12 and 24 weeks Baseline, 6 mndr Baseline, 1 and 3 months Baseline, 3 and 6 months Baseline, 1,2,4 and 6 months | 1-9 treatments Duration: 1-5 weeks Number of pulses between 800 and 5000 0.03 - 0.29 mJ/mm2 1 bar = 0.1 mJ/mm2 1MPa = 10 bar | Assessment tools Visual Analogue Scale (VAS) BCTQ (Boston carpal tunnel questionnaire) Levine Self-assessment Questionnaire QuickDASH Questionnaire, CMAP (compound muscle action potential) SNAP (sensory nerve action potential) SNCV (Sensory nerve conduction velocity) CMAP (Median compound motor action potential) |

| STUDY | DOSE | CONTROL GROUP | EFFECT | METHOD |
|------------------------------|---|--|--|--|
| Atthakomi et al.(6) rESWT | 1 well ESWT 4 bar, 15 Hz, 5000 pulses | A: ESWT B: cortisone blockade | A: Between 12 and 24 weeks of the check-up, increasing positive effect with increased function and decreasing pain B: no improvement over the same period | Probe perpendicular to the wrist, 3 - 7 min. Ice packing afterwards |
| Chang et al.(7) rESWT | All PRP After 14 days 1 treatment with ESWT or sham ESWT 2000 pulses, 4 bar, 5 Hz | A: PRP + ESWT B: PRP + sham ESWT | No effect between the groups. | Sitting, Supinated forearm. The probe perpendicular to the wrist. |
| Ke et al.(8) rESWT | 1 treatment per week for 3 weeks (A+C) B: 1 treatment in total All provided night splints 2000 pulses, 4 bar, 5 Hz | A: ESWT B: ESWT C: sham ESWT | A: Significant improvement. Better effect in moderate-impact participants than mild exposure. B: no effect C: no effect | Sitting, supinated hand. The probe perpendicular to the wrist and the median nerve Pulses distributed between the area from the pisiform/scaphoid line and 2 cm proximal to it, focusing on the median nerve |

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| <p>Notarnicola et al.(9) fESWT</p> | <p>3 treatments but 1 week apart 1600 slag, 0.003 mJ/mm², 4 Hz</p> <p>All wore night splints and completed an exercise program.</p> | <p>A: ESWT</p> <p>B: special treatment used to treat nerve compression*</p> | <p>Improvement in both groups.</p> <p>The pain improves in both groups, ESWT experiences a worsening at 4 months, but then improvement again. Both groups have improved function and reduced pain. The ESWT effect is obtained faster after approx. 1 month. In the spa group, the improvement inserts later.</p> <p>Both groups experience significant improvement after 6 months</p> <p>Both treatments are recommended, depending on the local context in clinical practice.</p> | <p>Probe perpendicular to the wrist 800 slag medial for n. medianus, 800 lateral for n. medianus</p> |
| <p>Poaloni et al.(10) fESWT</p> | <p>15 treatments with US (5 treatments every week for 3 weeks)</p> <p>15 treatments cryo-US (5 treatments every week for 3 weeks)</p> <p>ESWT 4 treatments over a period of 3 weeks. 2500 pulses, 0.05 mJ/mm²</p> | <p>A: ESWT</p> <p>B: cryo-US (cold from the sound head - 8 degrees + US)</p> <p>C: UL</p> | <p>Significantly reduced pain and improved function in all groups</p> <p>ESWT group experiences greatest reduction in pain</p> | <p>Not described</p> |
| <p>Raissi et al.(11) rESWT</p> | <p>3 treatments, 1 x a week for 3 weeks 1000 pulses, 1.5 bar, 6HZ</p> | <p>A: ESWT + night splint after ESWT treatment</p> <p>B: natskinne</p> | <p>Both groups experience clinical improvement, but the ESWT group achieves significantly better nerve conduction speed.</p> | <p>Perpendicular to the wrist</p> |
| <p>Seok et al.(12) fESWT</p> | <p>1 treatment with ESWT 1000 pulses, frq: 6Hz, intensity: to the individual's pain threshold (0.09 - 0.29 mJ/mm²)</p> | <p>A: ESWT</p> <p>B: cortisone blockade</p> | <p>ESWT significant function improvement at 1 and 3 month controls</p> <p>Nerve conduction velocity and other neurogenic related symptoms improve significantly in the blockade group - but not in the ESWT group.</p> | <p>Sitting with supinated wrist Forearm and fingers fixed with tape Medianus localized at the US Probe horizontal on the wrist</p> |
| <p>Vahdatpour et al.(13) fESWT</p> | <p>ESWT 1 treatment per week for 4 weeks. 3 Hz 1: 800 slag, 0.05 mJ/mm² 2: 900 slag, 0.07 mJ/mm² 3: 1000 slag, 0.1 mJ/mm²</p> | <p>A: ESWT</p> <p>B: sham ESWT</p> | <p>All parameters significantly improved in the ESWT group for up to 6 months.</p> | <p>Seated, flexed elbow, hand supine, probe 90 degrees above the median nerve</p> |

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| | 4: 1100 slag, 0.015 mJ/mm ² Night splint 3 months + NSAIDs for 2 weeks, and vitamin B1 for 4 weeks for both groups | | In B, there was a significant improvement in the first 3 months, after which the symptoms worsened again until 6 months. | |
| Wu et al.(14) rESWT | All with night splints ESWT: 2000 pulses, 4 bar, 5 Hz | A:ESWT B: sham ESWT | The ESWT group experiences significantly reduced pain, increased level of function and decreasing CSA diameter (circumference of the n.medius) | Seated , n.median is located outside the pisiform line with the ULS, treatment is performed from the pisiform line and 2 cm proximal thereof Probe perpendicular to the wrist |
| Xu et al.(15) rESWT | 3 treatments, 1 per week for 3 weeks 1000 pulses, 1.5 bar, 6 Hz Blockade UL guided | A: ESWT B: cortisone blockade | Significant improvement in both groups. ESWT has a greater improvement at the 9 and 12 week check-up. The pain improves for the first 4 weeks, then it increases again in the blockade group. ESWT group exhibits increased nerve conduction velocity and sensory improvements | Seated, elbow flexed, supinated wrist, median nerve localized with US, line outside pisiform and 2 cm proximal to this is treated. Probe perpendicular to the wrist |

*Notarnicola et al.(9): ALA 300 mg, Echinacea 250 mg, GLA 180 mg, Selenium 55 µg, Vitamin E 5 mg, Vitamin B6 2 mg, Vitamin B1 1.4 mg, Vitamin B12 1 µg, Selenium 55 µg, quercetin 49,50 mg, gluconate zinc 105 mg, zinc 14 mg, Vitamin C 60 mg, folic acid 200 µg, Polyphenols 10 mg. 1 kapsel 2 x om dagen i 40 uger, herefter 1 kapsel om dagen i 80 dage. Ziegler et al. 2006. Jamal et al. 1990

The authors' own conclusion when comparing all the results found in the included studies:

“Shock wave therapy could be conductive to improve syndrome and hand function for carpal tunnel syndrome patients.

Implications for rehabilitation:

- Shock wave therapy is beneficial for alleviating syndrome and improving hand function of carpal tunnel syndrome patients.
- Radial shock wave therapy seems superior to focused shock wave therapy on syndrome alleviation and functional recovery of hand in carpal tunnel syndrome patients.

CONCLUSION

The included studies indicate that ESWT may have a beneficial effect on carpal tunnel syndrome in the medium term. At first glance, it seems that rESWT may be preferable, as the studies involving rESWT can also demonstrate an improved neurogenic effect, in addition to reduced pain and improved functional level.

ESWT should be seen as a part of treatment, in combination with e.g. relieving night splints and relief in general.

There are no clear indications that the effect in the short term is better than, for example, cortisone treatment – but more beneficial in the long term. US treatment and ESWT are equally effective, but it requires 15 treatments spread over 3 weeks, whereas 4 ESWT treatments achieve a similar effect.

RECOMMENDATION

Based on the above conclusion, we recommend that ESWT can be included in the treatment of carpal tunnel syndrome.

We propose the following approach:

Patient seated with flexed elbow and supinated forearm with outstretched wrist.

The median nerve is located in the line between us pisiform and us. scaphoideum, if necessary with ultrasound scan

From this line and 2 cm proximal to it, the number of pulses is distributed equally over the median nerve and immediately laterally and medially to the nerve.

Treatment must be pain free.

Dose rESWT: 3 treatments 1 time a week for 3 weeks, number of pulses between 1000 and 2000 beats, between 4-6 Hz, between 1-4 bar. The starting point is the individual patient's pain level and tolerance

Dose fESWT: 3 treatments 1 week apart, number of beats between 1000 and 2000 beats, between 3-4 Hz, between 0.03 - 0.29 mJ/mm²

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