

CASE REPORT

## Carpal tunnel syndrome caused by vascular nerve impairment treated with open release of the carpal tunnel

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### Abstract

We present a patient suffering from classical unilateral symptoms of carpal tunnel syndrome, where the results of electrophysiological examinations were negative. Ultrasound showed a pulsatile median artery that led to direct mechanical impact on the median nerve. The patient was successfully treated with open release of the carpal tunnel.

### Keywords:

carpal tunnel syndrome, ultrasound, punched nerve, median artery

### History

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### Introduction

Carpal tunnel syndrome (CTS) is caused by compression of the median nerve and has a multifactorial etiology, including idiopathic, systemic, and anatomical factors [1-3]. Symptoms of CTS are numbness, pain, and paresthesia at the area of the hand that is innervated by the median nerve. Symptoms tend to be increased during repetition of motion or during nighttime. Clinical diagnostic tests like Tinel's and Phalen's test and objective signs like presence of thenar atrophy are often helpful in the diagnosis. In the end, CTS diagnosis relies on a combination of symptoms, clinical findings and electrophysiological examinations.

Studies have shown that ultrasound (US) can be helpful in CTS diagnosis when routine examinations prove to be inadequate [4,5]. US has a great advantage in that it shows anatomical abnormalities, which also can be of great help for the surgeon in the preoperative planning [3,6,7].

We report a patient in whom US had shown intimate contact between the median nerve and median artery, a rare anatomic variation, causing CTS [8]. The patient was treated with open release of the carpal tunnel, successfully relieving the symptoms.

### Case report

A 45-year-old woman was referred to the department of orthopedic surgery for treatment of CTS in her left hand. The patient was a healthy woman, with no particular medical

history of illness and had employment as a cleaner, with daily exposure to strenuous and repetitive load on her hands. Ten years earlier, the patient had symptoms of CTS on her right hand and had decompression performed of the median nerve with good result.

Over a 1-year period, she developed increasing symptoms of pain and paresthesia in her left thumb, index, and middle fingers. The symptoms were constant and showed no variation.

The patient had positive Tinel's and Phalen's test but two electrophysiological examinations were performed that showed no signs of CTS despite the obvious symptoms and positive clinical tests. Therefore, a regular US examination for anatomy was made, and it revealed a median artery in close contact on the radial side of the median nerve in the carpal tunnel. Doppler US had the unique opportunity of showing the pulsatile character of the median artery that led to direct mechanical impact on the radial side of the median nerve. The phenomenon is also known as punched nerve syndrome [6].

The carpal tunnel was then open released under local anesthesia consequently, visualizing the close contact between the median nerve and a median artery (Figure 1). On the first postoperative day, the patient had no further symptoms and remained free of symptoms at 11 weeks follow-up.

### Discussion

This clinical case is interesting as it describes how US can be a supportive tool in diagnosing patients who have

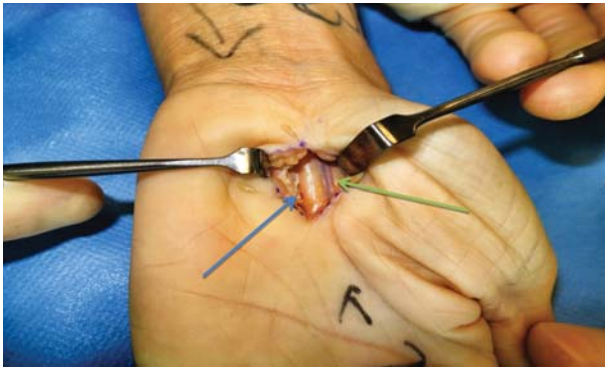


Figure 1. Digital illustration by Jan Robert Tarnowski. Open release of the carpal tunnel: The blue and the green arrows indicate the median nerve and the artery and vein, respectively.

symptoms and positive clinical diagnostic tests of CTS, but have negative electrophysiological examinations [9].

A median artery may not necessarily give any symptom, but this case report illustrates how the pulsatile character of the median artery, which led to direct mechanical impact on of the median nerve (punched nerve syndrome), can cause symptoms of CTS. This case report also illustrates how the diagnosis was verified during surgery and that patients with such anatomic anomalies can be treated with open release of the carpal tunnel.

US examination is a noninvasive, painless and rapid test that provides the physician with a useful technique in the diagnosis of CTS [5]. We recommend that US examination should be considered in cases of clinical suspicion of CTS where traditional paraclinical examinations are suspected of insufficiency. US also has a great advantage in that it shows anatomical abnormalities, which also can

be of great help for the surgeon in the preoperative planning [3,6,7].

### Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

### References

- [1] Becker J, Nora DB, Gomes I, Stringari FF, Seitens R, Panosso JS, et al. An evaluation of gender, obesity, age and diabetes mellitus as risk factors for carpal tunnel syndrome. *Clin Neurophysiol* 2002;113:1429–34.
- [2] Burt S, Deddens JA, Crombie K, Jin Y, Wurzelbacher S, Ramsey J. A prospective study of carpal tunnel syndrome: workplace and individual risk factors. *Occup Environ Med* 2013;70:568–74.
- [3] De Franco P, Erra C, Granata G, Coraci D, Padua R, Padua L. Sonographic diagnosis of anatomical variations associated with carpal tunnel syndrome. *J Clin Ultrasound* 2014;42:371–4.
- [4] Tajika T, Kobayashi T, Yamamoto A, Kaneko T, Takagishi K. Diagnostic utility of sonography and correlation between sonographic and clinical findings in patients with carpal tunnel syndrome. *J Ultrasound Med* 2013;32:1987–93.
- [5] Wiesler ER, Chloros GD, Cartwright MS, Smith BP, Rushing J, Walker FO. The use of diagnostic ultrasound in carpal tunnel syndrome. *J Hand Surg Am* 2006;31:726–32.
- [6] Loizides A, Peer S, Plaikner M, Djurdjevic T, Gruber H. Punched nerve syndrome: ultrasonographic appearance of functional vascular nerve impairment. *Ultraschall Med* 2012;33:352–6.
- [7] Khashaba A. Carpal tunnel syndrome from thrombosed persistent median artery. *J Emerg Med* 2002;22:55–7.
- [8] Walker FO, Cartwright MS, Blocker JN, Arcury TA, Suk JI, Chen H, et al. Prevalence of bifid median nerves and persistent median arteries and their association with carpal tunnel syndrome in a sample of Latino poultry processors and other manual workers. *Muscle Nerve* 2013;48:539–44.
- [9] Witt JC, Hentz JG, Stevens JC. Carpal tunnel syndrome with normal nerve conduction studies. *Muscle Nerve* 2004;29:515–22.