Pitfalls in using the ring finger test alone for the diagnosis of carpal tunnel syndrome

Abstract  Latency differences (>0.5 ms) of median and ulnar sensory action potentials (mSAP and uSAP) at the wrist evoked by ring finger stimulation are considered a sensitive and specific test for diagnosis of carpal tunnel syndrome (CTS). In this study, we aimed to assess the practical usefulness of the ring finger test (RFT) in routine electromyography (EMG) examinations. We investigated 2 series of patients: in the first prospective series we considered 300 hands affected by only mild CTS; in the second series we examined retrospectively the EMG charts of 961 hands affected only by CTS but not selected for severity or duration of symptoms. In the first series we found pathological RFT scores in 87% of cases, and pathological RFT or mSAP latency results in 92%. In the second series, pathological RFT scores were found only in 55% of cases, while in 20% where mSAP failed, a volume conducted uSAP had been erroneously interpreted as arising from the median nerve. RFT sensitivity tested in routine EMG examinations of unselected hands affected by CTS drops considerably. Fingers innervated by one only nerve, such as the index and the little fingers, must also be investigated to increase the diagnostic value of RFT.

Key words  Carpal tunnel syndrome • Ring finger test • Pitfalls

Introduction

The sensitivity and specificity of nerve conduction studies (NCS) and electromyography (EMG) in confirming the diagnosis of carpal tunnel syndrome (CTS), in addition to clinical history and physical examination, are generally accepted in clinical practice. In 1993 the AAEM Quality Assurance Committee, represented by Charles et al. [1] systematically reviewed the literature to provide evidence of the usefulness of NCS and EMG for the diagnosis of CTS. The authors concluded that there is convincing scientific evidence that median sensory and motor NCS are valid and reproducible clinical laboratory studies, with a high degree of sensitivity and specificity. Median sensory NCS confirm the clinical diagnosis of CTS more often than do median motor NCS [2-4]. Median sensory conduction (mSC) from wrist to digit (a distance of 13-14 cm) is less sensitive than techniques which value mSC over a shorter distance (7-8 cm) across the carpal tunnel [2, 3, 5], or which compare mSC through the carpal tunnel to sensory conduction of the ulnar [3, 6-9] or radial nerve [3, 10-12] in the same hand. The most sensitive techniques in electrodiagnosis of mild CTS are comparative tests, because they have the advantage that each patient is his own control and because several possible sources of errors (temperature and distance) are kept constant. Uncini et al. [13] reported that almost 40% of patients with typical CTS symptoms fail to show abnormalities using standard diagnostic criteria. Performing three median and ulnar comparative tests, these authors demonstrated that the difference of the distal sensory latency in the fourth finger, the so-called ring finger test (RFT), was the most sensitive [13].

The aim of the present study was to assess the practical usefulness of RFT in detecting CTS in routine examinations, because in the literature this test has been performed only in hands selected for mild CTS.
Methods

Two series of patients were studied. In the first prospective series we considered 300 hands clinically affected by mild CTS (192 patients, 146 females, mean age 54.5 years). In these cases, median and ulnar sensory action potentials (mSAP and uSAP) following ring finger stimulation could be clearly differentiated and median motor distal latency (mMDL) was normal. mSAP and uSAP were recorded at the wrist by stimulating fingers with ring electrodes at 13 cm from the recording electrode and by stimulating the palm with bipolar electrodes 6.5 cm from wrist. Median sensory distal palmar latency and median and ulnar sensory digital distal latencies (mSDL and uSDL) were measured. In order to exclude hands affected by concomitant neuropathies or radiculopathies, median and ulnar motor and sensory NCS, including motor distal and F-wave latencies, were performed. Median motor action potential was recorded with superficial electrodes from thenar muscles, stimulating supra-maximally the nerve at wrist and elbow. Ulnar motor action potential was recorded with superficial electrodes from hypothenar muscles, stimulating supra-maximally the nerve at wrist and above the elbow. Ulnar motor distal latency (uMDL) and mMDL were measured, and needle examination of abductor brevis pollicis was performed. Absolute values of mSDL and uSDL >3.4 ms and of mMDL >4.2 ms were considered pathological according to standard electrophysiologic criteria [14]. RFT resulted positive if the difference between mSDL and uSDL recorded from fourth finger was >0.5 ms [13].

In the second series we retrospectively reviewed all EMG examination charts collected in our neurophysiological laboratory archive from 1989 to 1992. We selected 961 hands from 771 patients (617 females, mean age 54 years) affected by CTS defined both clinically and by a neurophysiological test palette. No selection regarding severity or length of CTS symptoms was made, but we considered only those hands affected neither by concomitant widespread neuropathy nor by radiculopathy, and in which both motor and sensory median and ulnar NCS and needle examination of the abductor brevis pollicis had been performed. Also in the second series, mSDL and uSDL had been obtained after palmar and digital stimulation with the above-mentioned technique.

All NCS were performed by four electromyographers of the same institution, using a MEDELEC MS 92a electromyograph with a filter setting of 20-2000 Hz for sensory NCS and 20-10000 Hz for motor NCS and needle examination. Skin temperature was maintained at >31° C. During the examinations, the patients' hands were held with palms upwards and fingers relaxed.

Results

In the first series, the RFT was pathological in 87% of cases, and the absolute value of mSDL was pathological in 76%. Considering together the RFT and the absolute value of mSDL in the ring finger, at least one test was pathological in 92%. In 71%, both values were pathological (Fig. 1).

In the second series, 45% of hands had increased mMDL, and 50% had pathological palmar mSDL. In 45% and 57%, respectively, second finger and fourth finger mSDL were prolonged. In 49% there was fibrillation in EMG examination (Fig. 2). Since the condition for each hand to be included in this analysis was neurophysiological diagnosis of CTS, by definition at least one of these parameters included in the test palette had to be pathological. In the most severe cases, more parameters were pathological in the same hand. From the RFT alone, only 55% hands would have been classified correctly as CTS, but we found another 20% of hands in which, because mSAP failed, a volume conducted uSAP had been erroneously interpreted as arising from the median nerve.

Fig. 1 Pathological findings in 300 cases of mild CTS. mSDL, median sensory distal latency; RFT, ring finger test, median and ulnar sensory distal latency difference (>0.5 ms) recorded from the fourth finger