ABSTRACT

Purpose. To use a pick-up test to assess thenar motor deficit and results of opponensplasty.

Methods. Eight consecutive patients with idiopathic severe carpal tunnel syndrome and severe thenar motor deficit were identified. All were females aged 39 to 60 (mean, 53) years and right-hand dominant. The severity of thenar motor deficit was assessed using the pick-up test. Failure to pick up a coin with the thumb and index finger only in a normal pulp-to-pulp pincer grip was an indication for an opponensplasty (in addition to open carpal tunnel release) to hasten recovery of thumb abduction. Treatment outcome was assessed using the pick-up test at 6, 8, and 12 weeks.

Results. Preoperatively, all patients were unable to perform the pick-up test. At postoperative 6 weeks, all patients could pick up the coin with no difficulty and were satisfied with the result of opponensplasty. There was no relapse at subsequent follow-ups and no donor-site morbidity in terms of cosmesis, scar pain or infection. Grip strength and the range of wrist motion were 63% and 92% of the normal side, respectively.

Conclusion. The pick-up test is a simple and reliable means of identifying those in need of an opponensplasty.

Key words: carpal tunnel syndrome; median nerve

INTRODUCTION

There is no simple clinical test to assess the functional disability of severe carpal tunnel syndrome (CTS), particularly thenar motor deficit. It is difficult to determine whether a patient with severe CTS and thenar motor deficit should undergo an opponensplasty (in addition to carpal tunnel release), so as to hasten recovery of thumb abduction. We used a pick-up test to assess thenar motor deficit and the results of opponensplasty in addition to carpal tunnel release.

Pick-up test: an indication for opponensplasty in patients with severe carpal tunnel syndrome

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MATERIALS AND METHODS

Between January 2003 and December 2007, 8 consecutive patients with idiopathic severe CTS and thenar motor deficit were identified. All were females aged 39 to 60 (mean, 53) years and right-hand dominant; the right hand was affected in 7 patients. Their diagnoses were confirmed clinically and by electrophysiological studies. All patients failed initial conservative management with a wrist splint for 3 months. None had had prior steroid injection, acupuncture or surgery, nor a history of rheumatoid arthritis, diabetes mellitus, hypothyroidism, cervical spondylosis with radiculopathy, cervical myelopathy, syringomyelia, thoracic outlet compression syndrome, ulnar nerve palsy, post-traumatic wrist deformities, gout, amyloidosis, cerebrovascular accident, or pregnancy.

The severity of thenar motor deficit was assessed using the pick-up test. Failure to pick up a Hong Kong one-dollar coin (26 mm in diameter, 2 mm thick, 7 g) with the thumb and index finger only in a normal pulp-to-pulp pincer grip was indicative of severe thumb abduction deficit. Therefore, a Camitz-Littler opponensplasty in addition to open carpal tunnel release was considered necessary to hasten recovery of thumb abduction.

All operations were performed under a Bier block by a single surgeon. The mean operating time was 62 (range, 40–100) minutes. Postoperative rehabilitation consisted of a short-arm plaster of Paris slab for 3 weeks, with the thumb in full abduction to protect the transferred palmaris longus tendon. Thereafter, the hand was let free for functional re-education of the tendon by picking up the coin. Treatment outcome was assessed using the pick-up test at 6, 8, and 12 weeks by an independent observer. The mean follow-up period was 15 (range, 4–38) months.

RESULTS

The mean symptom duration was 37 (range, 9–120) months. Preoperatively, all patients had numbness of the radial 3 and half fingers; 7 had a positive Phalen’s test; 6 had a positive Tinel’s sign; and all were positive with respect to Durkan’s carpal compression test and the pick-up test. Some patients were able to pick up the coin using the awkward pulp-to-side pinch (thumb pulp against radial side of the index finger, Fig. a). The British Medical Research Council motor grading for the abductor pollicis brevis (APB), one of the 3 thenar muscles, was 0 or 1 (Table).

<table>
<thead>
<tr>
<th>Patient no.</th>
<th>Age (years)</th>
<th>Symptom duration (months)</th>
<th>Tinel</th>
<th>Phalen</th>
<th>Durkan</th>
<th>Thenar wasting</th>
<th>APB power (MRC grade)</th>
<th>TML (ms)</th>
<th>Amplitude (mV)</th>
<th>NCV (ms)</th>
<th>SNAP</th>
<th>Pick-up test</th>
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* APB denotes abductor pollicis brevis, MRC Medical Research Council, TML terminal motor latency, NCV nerve conduction velocity across transverse carpal ligament, and SNAP sensory nerve action potential.
In preoperative electrophysiological studies, the mean terminal motor latency of the motor nerve was 6.7 (range, 5.0–7.2; standard deviation [SD], 0.7) ms, the mean amplitude of the motor nerve was 0.9 (range, 0.2–1.9; SD, 0.5) mV, and there was no sensory nerve action potential. Nerve conduction velocity of the motor nerve across the transverse carpal ligament was 35.4 (range, 14.9–50; SD, 12) ms.

At postoperative 6 weeks, all patients could pick up the coin with no difficulty (Fig. b) and were satisfied with the results of opponensplasty. There was no relapse at subsequent follow-ups and no donor-site morbidity in terms of cosmesis, scar pain or infection. Grip strength and the range of wrist motion were 63% and 92% of the normal side, respectively.

DISCUSSION

After carpal tunnel release, recovery of motor branch function of the median nerve, if any, is subject to the severity of muscle wasting and capacity of nerve regeneration; most hands with thenar motor deficit (grade 0–3) improve by one grade of muscle strength. The pincer grip action requires the primary action of the APB. The pick-up test translates the thenar weakness into functional disability that can be tested clinically. The severity of APB motor deficit varies among patients with CTS. Some may have thenar wasting but a good functional pincer grip, depending on the severity of compression of the motor branch of the median nerve. Hand-held strength-testing devices have been used to measure the deficit, but its relevance to functionality is unknown. The pick-up test is a simple clinical test that measures functional disability of the APB by assessing the fine pincer grip. It is also a patient-rated clinical test that is more convincing as an indicator for opponensplasty than the Medical Research Council motor power grading coupled with pinch and grip strength testing. The Camitz-Littler opponensplasty provides excellent results with minimal donor-site morbidity. In our study, early recovery of thumb abduction was attributed to successful palmaris longus tendon transfer and rehabilitation, rather than nerve regeneration and improved muscle strength, which may take 18 to 24 months or even longer in patients having carpal tunnel release alone. Results of opponensplasty can be evaluated via the range of active thumb abduction and opposition (using maximum palmar abduction, spatial rotation, and thumb to finger opposition) and the Kapandji index.

Improvement of sensation in the median nerve territory after carpal tunnel decompression may improve performance in the pick-up test. 91% of hands had improved sensation 12 months after opponensplasty and carpal tunnel release. 89% of patients had improved 2-point discrimination after carpal tunnel release alone, and 96% of them had improved at postoperative 6 months. In our study, the improvement in the pick-up test performance at postoperative 6 weeks was likely due to the opponensplasty and rehabilitation, rather than any change in sensation. Future studies may exclude the sensation factor by placing a tape over the tips of the index finger and thumb. The contribution of carpal tunnel release alone to the re-innervation of APB motor fibres can be assessed using electromyography. Nonetheless, scar tissues around the transfer site make needle implantation difficult. Needle electromyographic studies are invasive and thus usually not used.

The sample size of our study was small, because most patients seek medical treatment in the early stage of the disease. Patients with severe CTS, motor weakness, and thenar atrophy were few. Our study can serve as a pilot study for comparing other methods of opponensplasty.

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REFERENCES