

# Clinical assessment of primary digital nerve repair

Dimitrios Efstathopoulos, Nicolas Gerostathopoulos, Diamadis Misitzi, George Bouchlis, Stavros Anagnostou and Nicolas K Daoutis

We have carried out a retrospective study of 64 primary digital nerve repairs in 50 patients who presented to our department between 1988 and 1993. 45 of the patients were operated on within 6 hours of the injury using microscope (x 14). Normal two-point discrimination was regained in only 9 cases, while 6–10 mm two-point discrimination was achieved in 22, 11–15 mm in 15 and protective sensation in 18. A

close correlation between age and recovery of sensation after repair was observed. Microsurgical repair of digital nerve gives satisfactory results, since a normal or good two-point discrimination can be obtained in about half of cases, while sensation improves in the rest. A high rate of complete recovery of sensation, however, is to be expected only in children.

Hand Surgery and Microsurgery Clinic, "K.A.T." Accident Hospital, Nikis 2 Kifisia, Athens Greece.  
Correspondence: D. Efstathopoulos, M.D. Tel +30-1-8012211 (x233). Fax +30-1-8012799

Injuries to digital nerves are frequent and primary repair under magnification is commonly performed. Although recovery of sensitivity after repair has been detailed by many authors during the past 30 years, the various results achieved remain controversial.

We report on recovery of sensitivity after primary epineural repair of 64 digital nerves, as assessed by Webers two-point discrimination test. This test has been considered by many authors a simple and reliable method for evaluating sensitivity in the hand (Dellon et al. 1974, Sullivan 1985, Berger and Mailander 1991). The Highet method light touch test (Sakellarides 1962, Wilgis 1982), stereognosis test and sweating were also used to evaluate the final clinical outcome. The subjective recovery of the patients was also recorded.

## Patients and methods

Over a 6 year period, 64 digital nerves were repaired in 42 men and 8 women with ages ranging from 2 to 64 years, with a peak incidence between 20 to 30 years. In 36 digits, a single digital nerve was injured and repaired. In 16 digits, both nerves were severed of which 28 were repaired, four nerves being unsuitable for primary neuroorrhaphy. 50 lesions were caused by sharp injuries and 14 by crushing. In 20 digits, the digital artery was transected together with the nerve, but the artery was repaired in only 5 cases. Both arteries were damaged in 4 fingers; and one

artery in each finger was repaired. A flexor tendon injury was present in 21 cases. The right and left hands were almost equally involved. The incidence on different digits was: thumb 18, index 17, middle 5, ring 6 and little finger 10.

Repair was carried out as an emergency procedure in 58 digital nerves. The other 6 cases were treated within 48 hours of the injury. Epineural neuroorrhaphies were performed using 9/0 or 10/0 nylon sutures. After repair, 32 digits were immobilized in a splint for an average of 3 weeks. The other 24 digits underwent early protected mobilization as required by the concomitant flexor tendon repair following Kleinert's method.

## Assessment

40 patients with 54 digital nerve repairs were available for final assessment. Information was retrieved from final discharge notes for 10 patients. The patients were assessed using the clinical tests of static two-point discrimination (2pd) (Table 1) and light touch (Highet's method) (Table 2). Stereognosis (ability to identify and recognize common objects) and sweating were also tested. The subjective recovery of the patients was also recorded. We found the Scoring System of 10 points introduced by Al-Chazal et al. (1994) useful in assessing the results of these tests (Table 3). Based on the number of points achieved in the above clinical tests, the results could be divided into four categories (Table 4).

**Table 1.** Classification of sensitivity according to two-point discrimination in mm (2pd)

Classification	2pd
Normal	< 6
Fair	6–10
Poor	11–15
Protective	> 15

**Table 2.** Hightet's method for the light touch test

S0	Complete absence of sensitivity
S1	Recovery of deep cutaneous pain (strong prick)
S2	Return of some degree of superficial cutaneous pain (light prick and tactile sensitivity)
S3+	Return of sensitivity with some recovery of 2 pd
S4	Complete recovery

**Table 3.** Points of the various clinical tests

Test	Poor	Fair	Good	Excellent
2pd (5 points)	> 15 mm (0.5 points)	11–15 mm (2 points)	6–10 mm (3.5 points)	< 6 mm (5 points)
Light touch (3 points)	S0 (0 points) S1 (1 point)	S2 (1.5 points)	S3 (2 points)	S3+ (2.5 points) S4 (3 points)
Stereognosis (1 point)	Negative (0 points)		Positive (1 point)	
Sweating (1 point)	Negative (0 points)		Positive (1 point)	

**Table 4.** Categories of clinical results

Excellent	≥ 9 points
Good	≥ 7 points
Fair	≥ 5 points
Poor	< 5 points (protective sensation)

**Table 5.** Recovery of sensitivity (2pd) according to age

2pd (mm)	1–10 years	11–40 years	> 40 years
< 6	5	4	–
6–10	–	7	3
11–15	–	10	4
>15	–	11	6

## Results

All 64 digital nerve repairs resulted in some return of sensitivity to the injured digits. Two-point discrimination of 5 mm or less was found in 9 cases. 5 children under 10 years of age were in this group. Values between 6 and 10 mm were observed in 22 cases and between 11 and 15 mm in 15 cases. A protective sensation (> 15 mm 2pd) was found in 18 cases.

A close correlation between age and recovery of sensation was observed (Table 5). Satisfactory recovery of sensation was achieved in all 5 children under 10 years of age in this series. In contrast, two-point discrimination of less than 11 mm was recorded in only half of patients between 11 and 40 years in age and only in one quarter of the patients over 40 years.

Two-point discrimination less than 10 mm was obtained in 35 of 50 repairs of sharp, guillotine type injuries, but in only 2 out of the 14 crush injuries. We did not find any relation between the nerve recovery and the presence of associated injuries.

Excellent results were achieved in 8 nerve repairs, good results in 25, fair results in 20 and poor results

in 11 of the nerve repairs. Hypersensitivity was seen in 6 patients, all with poor results.

## Discussion

Berger and Mailander (1991) presented a good review of digital nerve repair. Their follow up was for a minimum of 6 months which is necessary for most digital nerves to reach a stable endpoint. Using the 2-pd test, they had excellent results in 19 percent and good, fair and poor results in 27 percent, 18 percent and 31 percent, respectively. There is general agreement that complete recovery of sensitivity is frequently achieved in children, but rarely in adults. Sullivan (1985) reported 42 surgical nerve repairs with microsurgical technique. Two-point discrimination less than 6 mm was obtained in 7 repairs, between 6 and 10 mm in 12, between 11 and 15 mm in 12 and over 15 mm in 11 repairs.

Our results of microsurgical repair of 64 digital nerves are very similar to those of Sullivan and we consider them satisfactory, since normal or nearly-

normal sensation was obtained in half of the cases and sensation had improved in the others. However, a high rate of complete sensory recovery is to be expected only in children.

The type of injury is usually also considered a critical factor in determining the outcome of repair (Sullivan 1985). In our series, 2pd of less than 10 mm was obtained in 30 of the 50 guillotine type injuries and only in 2 of the 14 crush injuries.

Our results indicate that younger the patients are associated with better results, and that recovery can be improved by sensory re-education. We believe that microsurgical repair of digital nerves is a rewarding procedure and worth performing when technically feasible.

## References

- Altissimi M, Mancini G B, Azzara A. Results of primary repair of digital nerves. *J Hand Surg* 1991; 16B(5): 546-547
- Al-Chazal S K, Kiernan M, Khan K, McCann J. Results of Clinical Assessment after primary digital nerve repair. *Hand Surg* 1994; 19B(2): 255-257.
- Dellon A L, Curtis R M, Edgerton M T. Re-education of sensation in the hand following nerve injury. *Plast Reconstr Surg* 1974; 53(3): 297-305.
- Dellon A L. The moving two-point discrimination test : Clinical evaluation of quickly adapting fiber/receptor system. *J Hand Surg* 1978; 3(5): 474-481.
- Gelberman R H, Urbaniak G R, Bright D S, Levin L S. Digital sensibility following replantation. *J Hand Surg* 1978; 3(4): 313-319.
- Sakellarides H. A follow-up study of 172 peripheral nerve injuries in the upper extremity in civilians. *J Bone Joint Surg* 1962; 44A(1): 140-148.
- Sullivan D.J. Results of digital neurography in adults. *J Hand Surg* 1985; 10B(1): 41-44.
- Wilgis E F S. Nerve Repair and Grafting. In: *Operative Hand Surgery* (Ed. Green D) Churchill Livingstone, New York 1982; (2): 915-938.
- Wynn Parry C B, Salter M. Sensory re education after median nerve lesions. *The Hand* 1976; 8(3): 250-257.