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Postoperative Splinting for Isolated Digital Nerve Injuries in the Hand

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ABSTRACT: Digital nerve injuries in the hand are common and can result in significant impairment and functional restriction. Despite this, there is relatively little literature, particularly with respect to postoperative rehabilitation. Splinting after repair, purported to protect the repaired nerve from excessive stretch is still commonly used. Recent cadaveric studies indicate postoperative rehabilitation is not necessary with resection up to 2.5 mm. A randomized controlled trial was therefore undertaken to determine whether splinting after isolated 5th degree digital nerve transection is in fact necessary. Twenty-six subjects were recruited over a two-year period and randomized to either three weeks of hand-based splinting or free active motion. ANCOVA indicated no differences in sensibility at six months between the two groups. Subjects also reported their greatest functional limitations were because of hyperesthesia. Although this study is underpowered, these limited results suggest splinting may not be required postoperatively.

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Significant time and resources have been spent in recent decades advancing nerve repair techniques and developing tools to assist in the diagnosis and mapping of neural injury. This cannot be said, however, of the resources invested in researching rehabilitation strategies after neurorrhaphy. Dagum[1] acknowledged this, stating ''the question of how long to immobilize an extremity and hence a nerve after repair has never been properly addressed.''

Digital nerves are the most common upper limb nerve injured[2,3] and yet there is relatively little literature regarding digital neurorrhaphy; two retrospective case series to date have addressed splinting/immobilization post-neurorrhaphy.[4,5] Literature that assesses outcomes after repair is also less than ideal in terms of study methodology, often relying on two-point discrimination as the outcome measure of choice and reporting outcomes using the flawed Medical Research Council (MRC) sensory outcome reporting system.[6–10] The lack of literature may be due to the relatively trivial nature of the injury when compared with often concomitant flexor tendon injury and/or more proximal mixed nerve injuries. Research indicates that digital nerves have the best results of any sensory nerve repair.[1] Literature also, however, states that some patients do suffer significant functional impairment after digital neurorrhaphy in the form of poor two-point discrimination, cold intolerance, and hyperesthesia.[9–17]

In the Hutt Hospital, Plastic, Maxillofacial, and Burns Unit, Lower Hutt, New Zealand, our usual practice is up to three weeks of splinting/immobilization after nerve repair. Decisions regarding postoperative rehabilitation are based on many factors including 1) the patient's ability to access health care, 2) surgery/associated injuries, and 3) likely patient compliance.

Studies and anecdotal evidence suggest that immobilizing a joint or limb may lead to joint stiffness and impaired tendon gliding.[18] Splinting limits function, can delay return to work, and may also lead to hyperesthetic states. Furthermore, it is both costly and time consuming for both provider and patient.

The desire to advance the knowledge concerning splinting after digital neurorrhaphy is relevant on many fronts: 1) the high incidence of digital nerve injury, 2) the lack of evidence to support the ongoing

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use of weeks of splinting/immobilization after neurorrhaphy, 3) the functional impact these injuries can have on patients, and 4) the cost to both provider and patient of splinting and its sequelae.

The primary aim of this study was to determine if splinting is a necessary component of the rehabilitation strategy after digital neurorrhaphy.

THE ISSUE OF TENSION AFTER NEURORRHAPHY

Repairing nerves under "significant" tension is undesireable.[19] Axonal conduction and neural regeneration can be compromised. Soft-tissue morphology and revascularization findings support this.[20,21] Intraneural hemorrhage from suture line tension invites scar tissue proliferation between the nerve ends. Maturing scar tissue may shrink and constrict the nerve fibers and therefore retard axonal maturation and prevent proper myelinization.[22] Lundborg stated "slight physiologic tension (intra-operatively) is probably no disadvantage, as longitudinally oriented stress lines may provide useful contact guidance to the advancing axons."[19] The amount of physiologic tension that can be tolerated has neither been clearly defined,[19] nor have any studies investigated the functional implications of these neural changes. Just as it is unclear intraoperatively what is appropriate in terms of tension, it is unclear for postoperative care too.

Evidence for immobilizing a limb postoperatively comes indirectly from some animal studies.[21–23] Lee et al.[20] showed reduced vessel regrowth in a group of mongrel dogs that underwent transection and neurorrhaphy at the wrist. A further study showed reduced nerve conduction velocity in a group of New Zealand rabbits after transection and repair.[24] Soleus muscle weight and nerve fiber density were equivocal. Neither study assessed functional nerve recovery; the importance and relevance of which over simple electrophysiologic activity is acknowledged in the literature.[25]

Malczewski et al.,[26] and more recently Chao et al.,[27] to the contrary suggested splinting may not be necessary after digital neurorrhaphy. Both cadaveric studies assessed visible neural integrity after repeated resection, repair, and passive motion mobilization (including metacarpophalangeal joint hyperextension). Chao et al. reported "…early full passive range of motion exercises without a splint may be considered with a nerve gap of up to 2.5mm."[26] The limitations of extrapolating cadaveric findings to living tissue are acknowledged. Elasticity, nerve tethering, and scar formation are areas of concern.[26,27] Clare et al.[4] having undertaken a recent retrospective case series of splinted and nonsplinted patients concluded "splinting beyond the immediate post-operative period following repair of sharp, uncomplicated digital nerve divisions is unnecessary." Their results are inconclusive, however, as case series are not considered a high level of evidence. There is sufficient reason, therefore, to further investigate the issue of splinting post–digital neurorrhaphy in a living sample.

The sensibility recovery at six months post-op was compared between a group of subjects splinted for three weeks after digital neurorrhaphy and an intervention group permitted free active motion.

MATERIALS AND METHODS

Patients presenting to our facility with suspected fifth-degree (complete transection)[1,28] digital nerve injury were approached for consent. Ethical approval for the study was obtained from both hospital and Regional Ethics Committees. Subject recruitment was over a two-year period from 2003 to 2005. The study hypothesis was that there was no significant difference between splint and nonsplint groups at six months postoperatively with respect to the recovery of sensibility as assessed by Semmes–Weinstein Monofilaments (SWMs).

Only isolated fifth-degree[1,28] nerve injuries presenting for primary repair were included in the study.

Although literature is conflicting as to whether primary (repaired up to three weeks of injury[29,30]) or secondary repairs produce better results,[31] it was felt that studying only primary repairs would create a more homogenous group and minimize the effect of other cortical and peripheral neural reorganization processes. Minor associated soft-tissue injuries were permitted as long as the study regimes remained unchanged. Concomitant flexor tendon injuries and fractures were excluded on the basis that major associated injuries have a confounding effect on sensibility outcome.[32,33] Study design also took into account the confounding effect of age on sensibility[2,6,9,33–35] by randomizing subjects from two groups, those 40 years of age and under, and those over the age of 40.

Subjects who declined to participate underwent the control group treatment, but were not included in the data. (Table 1). Subjects were randomized pre- or intraoperatively using the block randomization method and sealed consecutively numbered envelopes. Subjects who were ineligible (e.g., incomplete nerve injuries) were told of this postoperatively and were excluded. A sample size of 60, 30 per treatment arm, was desired to be adequately powered and to infer statistical significance. This was based on a calculation with the alpha-level set at 0.05, power at 0.80, and the difference between the two means of 15%. A standard deviation statistic of 20.14 was used from pilot data to complete the calculation. Version

TABLE 1. **Rehabilitation Program**

Control Group	*Intervention Group*
Hand-based splint to be worn 24 hr/d replaces intraoperative forearm half-cast between Days 1–4 postoperatively. Wound dressings debulked. • Metacarpophalangeal joints positioned in 70–90° flexion; interphalangeal joints in full extension. • Two-hourly active flexion and extension to splint; 2-hourly passive extension to splint.	Dressings debulked Days 1–4 and early movement commenced. • Two-hourly active flexion and extension (permitted wrist and digital extension combined). • Advised to avoid full passive wrist and digital extension for first 3 wk.
Edema control using disposable adhesive wrap as required.	Edema control using disposable adhesive wrap as required.
Massage and desensitizing commenced as soon as sutures removed (Day 10 or thereabouts) as long as wound healing permitted.	Massage and desensitizing commenced as soon as sutures removed (Day 10 or thereabouts) as long as wound healing permitted.
Strengthening activities initiated after splint removal as required.	Strengthening activities initiated at 3 wk postoperatively as required.
Return to work commenced as soon as sutures removed in most circumstances.	Return to work for clerical/light work demands once sutures removed. This was managed case by case for heavy manual workers depending on sensitivity and strength.
Scar management initiated as required at 3–4 wk post-op.	Scar management initiated as required at 3–4 wk post-op.

12.0 SPSS for Windows was used for all statistical analysis (ANCOVA).

The surgery was performed by four plastic surgical registrars. A standard procedure implemented by surgeon author MR was used in each case.

Surgical Repair

All repairs were performed using an epi-perineurial technique. This refers to an epineurial technique with a best attempt at aligning individual fascicles. Resection of nerve ends did not exceed 2.5 mm. Those that were randomized to the splint group had temporary forearm-based splints applied in theater immediately post-neurorrhaphy.

Assessment

Sensibility status was measured at baseline (up to four days postoperatively), three, and six months postoperatively. An experienced hand therapist blinded to the subjects' group performed all assessments. Six months was considered a suitable time to measure sensibility return.[13,30,36]

OUTCOME MEASURES

Semmes–Weinstein Monofilaments

Light-touch threshold perception measured by a SWM Minikit was the primary outcome measure for this study. SWM measures the light-touch threshold perception component of sensibility validly and reliably,[38–40] and there is some evidence that monofilament results correlate with hand function.[40–44] SWM evaluates the degree to which neural regeneration and reinnervation of sensory receptors have occurred[37] and with a consistent application technique mapping can be used to serially record changes in neural status.[45] Literature suggests there is no loss of sensitivity using the minikit.[40] Two from three correct responses were necessary in this study to progress to a finer filament. Each affected hemidigit was divided into seven zones from the distal palmar crease to the tip of the digit (digits 2–5) and from the metacarpophalangeal crease to the tip of the digit if the thumb was involved (Figure 1). A five-point numerical ordinal scale initially described by Bell-Krotoski[46] was used to convert monofilament numbers to a numerical score. Perception of the 2.83 monofilament scored a maximum of five points; the 3.61, four points, and so on for the 4.31, 4.56, and 6.65 monofilaments. Failure to perceive the 6.65 monofilament was recorded as "untestable." This produced a maximum score per

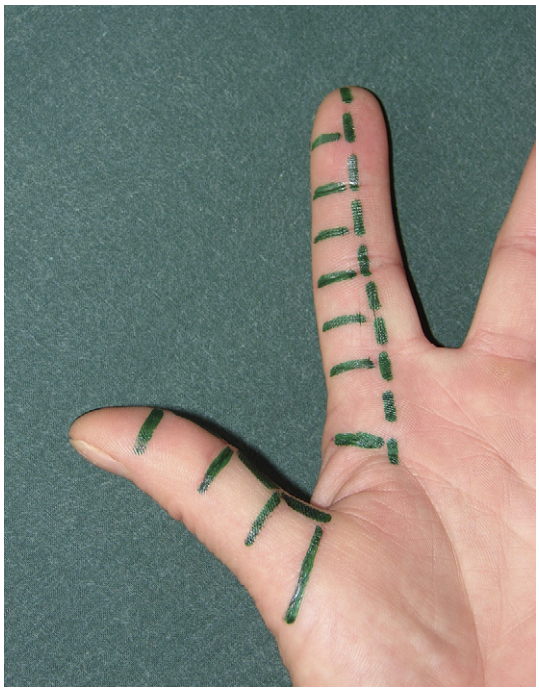

FIGURE 1. *Monofilament testing zones.*

hemidigit of 35 points for digits 2–5, and 20 points for the thumb (four zones). This score was converted to a percentage of the contralateral hemidigit to produce interval data. The assumption of equal sensibility between hands is supported by Hage et al.[47] The same kit was used for each subject's baseline, three-, and six-month measures due to possible tip diameter variation between kits.[42]

Static 2-point Discrimination

Weber's Static 2-point discrimination (S2PD) was also measured at baseline, three, and six months. S2PD was measured to provide additional information on sensibility recovery[37] despite well-documented concerns with respect to validity, reliability, responsiveness, and the lack of a standardized assessment procedure.[37,44,48–51] The Mackinnon–Dellon Disk-Criminator™ was used to assess S2PD in the hemidigit tip only. S2PD distances (mm) were then converted to a single number using an ordinal scale[37] ($\leq$5 mm = 3, 6–10 mm = 2, 11–15 mm = 1, and $\geq$16 mm = 0). Three from five correct answers were necessary for the subject to progress to a smaller distance. The affected hemidigit grade was then matched with the contralateral digit, giving a single number for both results. A ranking system was developed which ordered all S2PD combinations, including abnormal S2PD findings in the contralateral digit. This rating was based on the researcher's clinical experience, rankings from best possible outcome to worst (0 = full recovery, 3 = no recovery; e.g., should the affected score '3', and the unaffected '3', the final grade recorded was '0' [3 – 3]). If the subject had a baseline S2PD score of $\geq$6 mm, S2PD recovery was considered complete if the affected digit S2PD recovered to this point.

Subjective Outcome Measures

Subjective measures were recorded at three and six months postoperatively only.

Cold Intolerance

The definition for cold intolerance was borrowed from Engkvist et al. —"an icy cold feeling rapidly progressing to pain."[52] Four additional cold-related symptoms were added for clarity—pain, numbness/tingling, stiffness, and color change. The subject indicated their current cold intolerance symptoms and this was converted to an ordinal score[37] ("none-minor" = 3, "moderate" = 2, "disturbing" = 1, and "hinders function" = 0).

Hyperesthesia

Hyperesthesia was defined as "when hair or skin on the injured digit is touched, the sensation is unpleasant and excessively sensitive."[52] Administration and scoring were as for cold intolerance.

Overall Subjective Estimate of Outcome—The "Global Estimation of Recovery" (GER)[37]

Subjects were asked to quantify their degree of recovery at three and six months using a 10-cm Visual Analog Score. A lower score indicated less perceived physical disability.

SPLINTING

Dorsal hand–based thermoplastic splints were fashioned by an additional clinician to ensure blinding. For digits 2–5, the metacarpophalangeal joints were positioned in 70–90° of flexion with the interphalangeal joints in full extension. The thumb was positioned in approximately 15° of carpometacarpal joint flexion, 30° of metacarpophalangeal flexion, and full interphalangeal joint extension (Figure 2). The affected and immediately adjacent digit were splinted for single digit injuries. Splinting for digits 2–5 for injury combinations can be seen in Table 2. For isolated digital nerve injuries in the thumb, only the thumb was splinted. If thumb and digits 2–5 were injured, a single splint incorporating the necessary digits was fabricated.

OTHER REHABILITATION INTERVENTIONS

Except the initial exercise regime, all other rehabilitation was tailored to the subject (Table 1). Strength, work hardening, and functional activities were initiated after three weeks in both groups. The study subjects did not receive any formal sensory retraining due to time constraints.

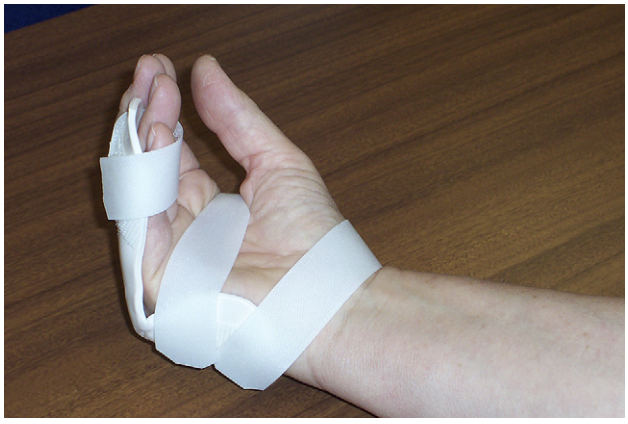

FIGURE 2. *Post-repair splint.*

TABLE 2. **Splinting Regime**

Digits Injured	*Digits Splinted*
Index and middle	Index and middle
Index and ring	All digits 2–5
Index and little	All digits 2–5
Little and middle	All digits 2–5
Little and ring	Little and ring
>2 Digits	All digits 2–5

RESULTS

Twenty-six subjects were admitted to the study over a two-year period (2003–2005).

Four subjects were found intraoperatively to have partial nerve injuries and were therefore excluded from the study. Two subjects declined to participate. Fourteen subjects were admitted to the splint group and 12 to the nonsplint group. Both groups were found to be similar at baseline in all respects (see Table 3). There were 11 sets of incomplete data. This was due to a failure to attend assessment in all cases. Seven patients failed to attend their three-month follow-up and a further four subjects failed to attend their six-month assessment. The ''last measure brought forward'' method was used to deal with missing data values as per the Intention to Treat Analysis.

The most common nerve injured was the little finger ulna digital nerve. The injuries were predominantly isolated digital nerves. There were no bilateral digital nerve injuries. Days to repair ranged from 0 to 16 in the splint group and from 0 to 10 in the nonsplint group.

Comparing Splint and Nonsplint Groups

ANCOVA Analysis

The mean average SWM outcome at three months was 76.94. At six months postoperatively, this had increased to 80.77 (95% confidence interval [CI] = 72.36–89.18; range 32–107; SD = 20.81) (Figure 3).

The SWM six-month results were normally distributed and therefore were analyzed using ANCOVA. ANCOVA allowed the sample means to be considered with respect to more than one independent variable.[53] Covariants were 1) baseline SWM, 2) level of injury, and 3) age. There was no statistically significant group effect (splint/nonsplint) on SWM six-month scores [ANCOVA $F(1/26) = 0.051$, $p = 0.824$].

TABLE 3. **Baseline Data Comparison**

	Splint	*Nonsplint*	*p-Value*		*Splint*	*Nonsplint*	*p-Value*
N	14	12		Nerves affected[a]			
Age				Little finger UDN	6	4	
Mean average	30.29	30.17	0.980	Other nerves	8	8	0.701
95% CI	23.02–37.56	23.41–36.92		Injury classification			
Gender				Sole digital nerve	9	7	
Male	11	9		Other[b]	5	5	1.0
Female	3	3	0.829	Injury level			
Ethnic group				PP crease to PIPJ crease	6	4	
NZ European	11	9		PIPJ crease to DIPJ crease	4	6	
Other[c]	3	2	0.531	Other[d]	4	2	0.431
Employment[e]				Mode average	1,2	1,2	
Heavy manual/n/a	9	5		Days delay to repair			
Clerical/light–moderate	5	6	0.435	Median average	1	1	
Median average	0	1		Range in days	0–16	0–10	
Hand dominance				SWM baseline			
Left	0	0		Mean average	60.18	63.50	
Right	14	11[f]	n/a	Range	25–83	10–100	
Injured hand				95% CI	49.7–70.66	46.71–80.29	0.709
Left	4	4		S2PD baseline			
Right	10	8	0.793	Median average	3	3	0.493

CI = confidence interval; UDN = ulnar digital nerve; pp = proximal phalangeal; PIPJ = proximal interphalangeal joint; DIPJ = Distal interphalangeal joint; n/a = not applicable.

[a]Categories collapsed due to small cell numbers. The only nerve that did not feature was the index finder UDN.

[b]Categories collapsed due to small cell numbers included ''digital nerve and other soft-tissue ipsilateral digit''; ''digital nerve and flexor sheath ipsilateral digit''; ''digital nerve and diathermy ipsilateral artery''; and ''others''—other soft-tissue not categorized.

[c]Collapsed ethnic group categories—cells positive for ''New Zealand Maori'', ''Samoan,'' and ''South East Asian.''

[d]Collapsed categories included ''distal palmar crease to proximal phalangeal crease''; ''distal to distal interphalangeal joint crease—digits 2–5''; ''Thumb: proximal to metacarpophalangeal crease''; ''metacarpophalangeal crease to interphalangeal crease''; ''distal to interphalangeal crease.''

[e]Employment categories collapsed due to small cell sizes.

[f]One subject failed to state his or her hand dominance.

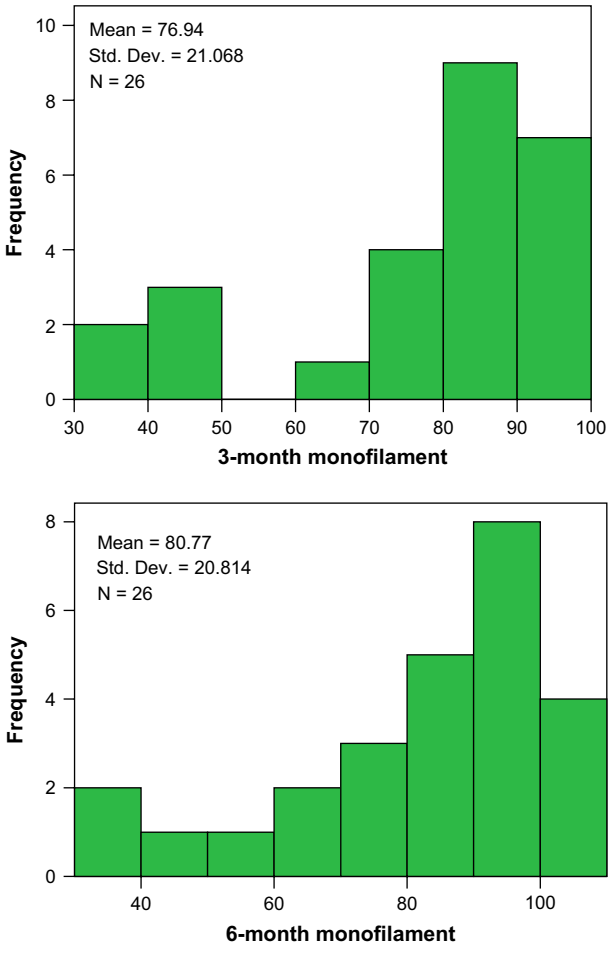

FIGURE 3. *Three- and Six-month SWM Results.*

Age ($p = 0.042$) and baseline SWM ($p < 0.001$) were, however, shown to have statistically significant effects on SWM scores.

Static 2-point Discrimination

Only two subjects recovered normal S2PD (≤5 mm) at six months post-op. Nineteen subjects were untestable at baseline (≥16 mm). Note that subjects who failed to attend their three-month ($n = 7$) and six-month follow-up assessments ($n = 11$) had their last measure brought forward. When completers only were analyzed, there was only one subject who remained untestable at six months post-op (Table 4).

TABLE 4. **S2PD Six-month Results**

	Frequency		
	All Data		*Completers Only*
S2PD Distance (mm)	*Baseline*	*6 mo*	*6 mo*
≤5	0	2	2
6–10	2	6	5
11–15	5	9	7
≥16	19	9	1

The Mann–Whitney U test was used to compare the S2PD change from baseline to six months between the two groups. No statistically significant difference was found ($z = -0.685$; $p = 0.493$).

Subjective Measures

A score of "0" on the Visual Analog Scale represented a full functional recovery in the subject's opinion; a score of "100" indicated the subject-perceived maximal disability. The mean average subjective estimate of recovery at six months post-op was 22.64 (95% CI = 14.94–30.34; range 0.5–60). Analysis of completers only changed this average slightly (22.8; 95% CI = 14.32–31.28; range 2.5–60).

A moderate, positive correlation was found between hyperesthesia outcomes and subjects' Global Estimation of Recovery (GER) scores (Spearman's r: $r = 0.617$, $p = 0.006$). This correlation was still significant when completers only were analyzed ($r = -0.567$; $p = 0.028$). No correlation was found between S2PD results at six months post-op and age ($r = 00.039$; $p = 0.851$). This correlation was also non-statistically significant when completers only were analyzed ($r = 0.179$; $p = 0.524$).

There was no statistically significant difference when the two groups were compared with respect to cold intolerance (Mann–Whitney U, $z = -1.844$; $p = -0.065$), hyperesthesia (Mann–Whitney U, $z = -1.096$; $p = 0.273$), or the "Global Estimation of Recovery" (t-test, $t = 0.822$, $df = 16$; $p = 0.423$) (Table 5).

DISCUSSION

There was no difference between splint and nonsplint groups with respect to sensibility at six months postoperatively *(Q major finding)*. Calculations determined 28 subjects per group were necessary for adequate study power. There was a high dropout rate (42%) and a lower than expected subject recruitment during the study *(Q high dropout rate contributed to underpowering)*. Although this study was, therefore, markedly underpowered, results suggested that there may in fact be no difference between splint and nonsplint groups with respect to sensory return after simple isolated digital neurorrhaphy. This may suggest that stretch to the healing nerve (1.2–7 mm depending on digital region[54]) imparted by free active motion postoperatively may then be within tolerable limits. This means repair integrity is maintained and regeneration can proceed unhindered. It is important, however, to acknowledge the unquantifiable effects of both central and peripheral neural processes on sensory outcomes. Specific cortical and subcortical reorganization can occur within minutes of injury and can be longstanding, if not permanent.[55] Cortical changes may "parallel altered and changed

TABLE 5. **Cold Intolerance, Hyperesthesia, and Global Estimation of Recovery Results, Three and Six months: All Data**

Outcome Measure	*Grade*	*Splint Group*	*Nonsplint Group*	*Totals*
Cold Intolerance				
3-mo Results	None/minor	3	6	9
	Moderate	4	0	4
	Disturbing	4	2	6
	Hinders function	0	0	0
	Totals	11	8	19
6-mo Results	None/minor	2	5	7
	Moderate	5	2	7
	Disturbing	4	1	5
	Hinders function	0	0	0
	Totals	11	8	19
Hyperesthesia				
3-mo Results	None/minor	3	3	6
	Moderate	4	5	9
	Disturbing	3	0	3
	Hinders function	1	0	1
	Totals	11	8	19
6-mo Results	None/minor	4	5	9
	Moderate	7	3	10
	Disturbing	0	0	0
	Hinders function	0	0	0
	Totals	11	8	19
Global Estimation of Recovery				
Better		4	3	7
Worse		3	4	7
No change		2	2	4
Data missing for 3-mo measure[a]		4	4	8
	Totals	13	13	26

aThese subjects failed to attend their final assessment and had their 3-mo measures brought forward.

subjective sensibility in partially denervated human skin and may contribute to the explanation of perception which occasionally appears to arise within the autonomous zone.''[56] Unmasking of peripherally silent inputs can result in a greater than normal receptor field overlap representing neural input from ''intact parts of the peripheral receptor surface.''[56] This may explain why a number of subjects' baseline SWM results (in the injured nerve's autonomous skin zone) were hardly reduced. True regeneration could not have been expected at this point. Collateral sprouting refers to the neural ingrowth of neighboring intact nerves into the denervated zone after injury. This process may also be partly responsible for the improvement in sensibility over time in some subjects.

Sensory relearning and desensitization can influence both sensory recovery, and pain and discomfort symptoms after injury.[6,57,58] Although there was no formal sensory reeducation component in this study, it is possible that variable tactile stimulation resulted from everyday functional use (or lack thereof), which may have been confounding.

Many studies have documented poorer S2PD[2,6,8,9,11,17,30,33–35] and Moving 2PD[2,9] results with advancing age. This study's results showed neither S2PD nor SWM results correlated with age. This may be explained by several factors. Firstly, the small sample size may have been insufficient to see a trend with results. Secondly, as children were excluded from the study, the excellent results often seen in children were not present. Thirdly, this study used an ordinal scale to rank S2PD recovery, using the contralateral hand as the subject's control. Comparing results using actual S2PD distances (mm) may have produced different results. Please also note that two of these studies that demonstrated a correlation between age and sensory recovery reported outcomes using the flawed MRC grading system.[6,8] Other studies[11,17,30,33,34] included associated injuries in their study samples and crush mechanisms that alone have confounding effects on sensibility return.

An overall subjective estimation of recovery (named here as the ''Global Estimation of Recovery'') has been used by Rosén and Lundborg[37,59] as a simple way to measure subjective outcome after nerve transection in the wrist or distal forearm. Subjective recovery results were used to validate a new activities of daily living (ADL) questionnaire[37] and a new complete nerve assessment battery.[59] Subjective scores were shown to correlate best with the overall test battery score ($r = 0.83$) and the pain/discomfort domain ($r = 0.76$).[59] The results from the present study are similar in that the GER correlates well with digital nerve hyperesthesia scores.

Compliance with splint wearing was emphasized at therapy visits. It is possible although all subjects reported wearing their splints 24 hr per day, seven days per week, this may not have been the case. In future studies, it may be useful to secure thermoplastic splints with plaster of Paris to be more certain of compliance.

This study is the first of its kind to investigate the issue of splinting after digital neurorrhaphy in a living sample. Despite having low power, study results are sufficiently encouraging to be worthy of further study. Further recruitment has in fact resumed at Hutt Hospital. It may be ethically difficult to incorporate a third arm of ''complete immobilization'' after digital neurorrhaphy to define the effect of movement per se. The strict inclusion criteria ensured a homogenous study group and minimized the confounding effects of associated injuries on sensibility return. The author, however, acknowledges widening the inclusion criteria would increase the study sample size more rapidly.

CONCLUSION

In this underpowered study, it is impossible to present conclusive evidence. Nevertheless, the results suggest that there may be no significant difference in sensibility recovery at six months after nerve repair of complete digital nerve laceration whether the patient is splinted postoperatively of unrestrained and permitted full active motion.

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Quiz: Article # 067

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#1. This study looked at sensibility outcomes after digital nerve repair in patients with
   a. complex injuries
   b. complete transections
   c. partial lacerations
   d. compression neuropathies

#2. The two groups that were compared were a group of patients who were
   a. tested by static 2 point discrimination and a group tested by moving 2 point discrimination
   b. given sensory re-education and a group not given sensory re-education
   c. free to move post op and a control group
   d. splinted post op and a group who were free to move post op

#3. The primary finding of the study was that
   a. there was a significant difference in recovery in that the splinted group had a better outcome
   b. there was no significant difference in groups, as determined by cold intolerance and functional recovery
   c. there was no significant difference in sensibility between groups, as determined by SWM and 2 point discrimination
   d. there was a significant difference in recovery in that the splinted group had a worse outcome

#4. Due to the study's being underpowered
   a. further investigation will be fatally flawed
   b. the reader must reserve judgment as to the results
   c. the reader must disregard the results
   d. the reader must splint all such patients post op

#5. Surgery was performed by
   a. 4 different surgeons using a standardized procedure
   b. 4 surgeons from 4 different facilities
   c. the same surgeon throughout the study
   d. 2 surgeons throughout the study

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