**ORIGINAL ARTICLE**

# Does Postoperative Immobilisation Improve Sensory Recovery following Isolated Digital Nerve Injury?

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## ABSTRACT

This study reviewed 46 patients retrospectively following repair of isolated, sharp digital nerve injury. All nerves were repaired during the period October 2003 and September 2005 with a follow-up ranging between 6 and 18 months. In this clinical study, 24 were treated by controlled mobilisation postoperatively over a period of four weeks while 22 were treated by immobilization postoperatively over a same period. Return to work, cold sensitivity, scar sensitivity, 2 point discrimination, range of motion, grip strength, differentiation between sharp and dull objects and differentiation between hot and cold objects were used as indicators of digital nerve recovery.

**Keywords:** Digital nerve repair, postoperative mobilisation vs. immobilisation, outcome

## INTRODUCTION

Digital nerve injuries are common and microsurgical repair is well described, meticulous coaptation, viable nerve endings and well vascularised bed are important factors in establishing a good recovery (Andrew, 1999). A study on canine models has shown that early motion following nerve repair seems to impede nerve regeneration by enhancing scar formation and delaying the revascularization process at neurorrhaphy **(**Andrew, 1999). In the same study it is suggested that following repair of isolated nerve injuries, motion should be postponed until intraneural blood vessels have crossed the repair, which occurred at 3 weeks in their experimental model (Andrew, 1999). In contrast to this, others conclude that splinting beyond the immediate postoperative period, following repair of sharp, uncomplicated digital nerve divisions is unnecessary and their results suggest that splinting may actually be deleterious to outcome (Clare, 2004)

In the light of above contradictory studies we performed a retrospective analysis of our experience of postoperative mobilization and Immobilisation regimes in isolated digital nerve injuries to determine whether postoperative immobilisation affects sensory recovery.

## PATIENTS AND METHODS

All patients (n=97, age range, 7–55 years) who underwent digital and common digital nerve repairs following isolated, sharp, uncomplicated digital nerve injury over a 24 month period from October 2003 to September 2004 were invited to partake in this study.

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Fort six patients agreed to participate and were reviewed for this study between 6 and 18 months following surgery. The minimum postoperative follow up period was 6 months. Of the 46 patients who responded, 24 had been treated by postoperative controlled mobilisation and 22 had been treated with postoperative immobilisation.

**Surgery and Splinting:** Surgery was performed by registrars and digital nerves were repaired with 8/0 or 9/0 nylon interrupted sutures. Loop magnification X 2.5 to 3.5 was used during the procedures. In mobilization group, dorsal blocking splint was used and early active mobilisation was started within 24 hours of surgery and continued for 3 weeks. In immobilisation group, at the time of surgery, volar resting splint in functional position of the hand was used for three weeks. All patients were operated under General Anaesthetic. Post operatively Cellacast was used for splitting which was changed to thermoplastic splint (Fig 1, 2) next day.

Fig.1. Thermoplastic Dorsal Splint

Fig.2.Thermoplastic Volar Splint

**Questionnaire and Examination:** Demographic and clinical data including gender, age occupation, date and mechanism of injury, date of operation, dominance of hand, return to work, scar sensitivity and cold sensitivity was collected on a questionnaire. All patients attended special clinic for purpose of this study and were examined. Clinical criteria including range of motion, grip strength and sensory recovery of digital nerve were assessed and recorded. Range of motion was examined with digital goniometer and grip strength was measured with dynamometer. Sensory recovery was assessed; using two-point discrimination, differentiation between sharp and dull, and hot/ cold . The non operated hand was examined and used as a control. Means of indicators were obtained, recorded and comparative analyses were performed for both groups.

## RESULTS

There was no significant difference between these two groups (Table 1) with respect to return to work. Scar sensitivity in mobilisation group was observed in 14 patients (58.3%) and in immobilisation group numbers of patients were 12(54.5%). Majority of the patients in both groups had mild scar sensitivity. Same number of patients presented with cold sensitivity and most of them had mild cold sensitivity in the two groups.

No remarkable difference was observed in two point discrimination in immobilisation confirming improved sensory recovery when compared to mobilisation group. Between these two groups (mobilisation in splint) and (immobilisation in the splint) all the patients presented with full range of motion at the time of assessment and good grip strength with full recovery of protective sensations(differentiation between sharp and dull as well as cold and hot).

Table 1:

| | **Mobilisation Group** | | **Immobilisation Group** | |
|---|---|---|---|---|
| Return to work | 7.1 Weeks [mean] (Range: From 4 Wks to 14Wks) | | 7.8 Weeks[mean] (Range: From 4 Wks to 16 Wks) | |
| Scar sensitivity | 14(58.3%) | | 12(54.5%) | |
| | Severe | 2(8.3%) | Severe | 1(4.5%) |
| | Moderate | 3(12.5%) | Moderate | 3(13.6%) |
| | Mild | 9(37.5%) | Mild | 6(27.2%) |
| 2 point DCR | **Static** | 6.8mm (mean) | **Static** | 6.mm (mean) |
| | Range | 4mm to 11mm | Range | 4mm to 10mm |
| | **Mobile** | 5mm (mean) | **Mobile** | 4.8mm (mean) |
| | Range | 3mm to 7mm | Range | 3mm to 9mm |
| ROM (range of motion) | Full ROM at the time of assessment | | Full ROM at the time of assessment | |
| Grip strength | Equal or more(In case of Dominant Hand) | | Equal or more(In case of Dominant Hand | |
| Differentiation cold/hot | ALL | | ALL | |
| Differentiation Sharp/dull | ALL | | ALL | |

## DISCUSSION

Adequate debridement of nonviable nerve endings, anatomic coaptation without tension, and a well-vascularised environment for proper healing for successful nerve repair are of prime importance. The role of postoperative mobilization in isolated digital nerve injuries is controversial.

In previous animal study (Andrew 1999), it was concluded that early motion seemed to impede nerve regeneration by enhancing adhesion formation and delaying the revascularization process at neurorrhaphy. The author suggested that in isolated nerve injuries, motion should be postponed until intraneural blood vessels had crossed the repair, which occurred at 3 weeks in their experimental model. In the same study it was also suggested that in combined injuries involving nerve and other structures, early motion should not be undertaken without considering its potential adverse effects on axonal regeneration. It is noteworthy that the said

study was on canine model and conclusions were based on histological rather clinical findings.

In another study (Clare, 2004) that addressed the issue of postoperative mobilisation or immobilisation regime, it was suggested that not splinting patients improved outcome while splinting delayed return to work and increased the incidence of stiffness and cold intolerance. In their study, they conducted that splinting beyond the immediate postoperative period, following repair of sharp, uncomplicated digital nerve injury was unnecessary as their results suggested that splinting might actually be deleterious to outcome, as well as incurring extra costs to the Health Service in materials and time.

Other studies recommend splinting the digit beyond the immediate postoperative period to block extension and prevent damage to digital nerve repair (Altissimi, 1991; Goldie, 1992) Two other studies have used human cadaver digital nerve repair models with various nerve gaps created by nerve resection. They showed that no repair ruptures occurred in the unsplinted group if the resected segment was less than 5mm (Chao, 2001; Malczewski; 1995)

Our study is based on clinical findings. As digital nerves are of sensory importance, the prime outcome of repair should be assessed on clinical results particularly restoration of protective sensation and minimising complications. Our study suggests that there is no significant difference in clinical results between postoperative mobilisation or immobilisation regimen following repair of isolated digital nerve injury.

The clinical results and outcome in our study differ somewhat from the study of (Clare et al 2004) addressing the issue of postoperative mobilisation or immobilisation regime in isolated digital nerve injuries. We concluded that there is no significant difference in return to work following isolated digital nerve repair in both mobilisation and immobilisation regimes. We would like to suggest to other centres dealing with isolated digital nerve injuries to analyse and present their experience either retrospectively or prospectively to determine whether postoperative mobilisation or immobilisation affects sensory recovery on clinical grounds.

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