Peripheral Nerve Injuries - An Analysis of 75 Cases

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ABSTRACT

**Background:** Peripheral neural trauma is a common injury seen both in civilian practice and warfare. Majority of such neural damage is caused by glass cut. The agent causes extensive damage to the underlying structures from an apparently looking small incised wound.

**Material and Methods:** We explored the wounds of 75 patients under anaesthesia to look for injury to the underlying peripheral nerves. Upon identifying the injured nerve, primary repair using epineural microsurgical technique was carried out using very fine sutures and micro-instruments. The patients were followed sequentially in the post-operative period.

**Conclusion:** When such a protocol was adhered to, the results of nerve repair were excellent in majority of the patients. J Med Sci 2010;13(1):7-10

**Keywords:** Height scale, Epineural repair, Median nerve, Ulnar nerve.

**Introduction**

Peripheral nerve trauma has been quite common in the civilian practice and the surgeons have had to manage severe extremity trauma with underlying neural damage. These injuries are on an increase presently due to modernization and undeclared warfare. Despite advances in surgical technique, peripheral nerve function after injury is dependent on many factors that elude the surgeon. The process of Wallerian degeneration and peripheral nerve regeneration is complex, inter-related and influenced by multifactorial determinants. The age of patient, the level of injury and perhaps even the flexibility of the patient’s psyche seem to be the major determinants of how well the nerve regenerates in the clinical setting.

Glass has been the major culprit in inflicting serious neural damage and a small looking skin wound often disguises the extensive nature of the injuries beneath. A thorough exploration of the wound under general anaesthesia is a prerequisite to identify the underlying nerve injury. The more recent innovations in repair are the use of delicate technique, the process of operative magnification, the use of smaller sutures and avoidance of excessive tension across the repaired site.

**Material & Methods**

Seventy five patients with peripheral nerve trauma, were admitted to the Plastic and Reconstructive unit of Sher-i-Kashmir Institute of Medical Sciences, and were studied between June 2006 and September 2008.

The average age of the patients was 26.4 (range 7-65 years). Sixty four patients (85.3%) were men and eleven were women (14.7%). Thirty three patients were students (44%), who suffered a sharp wrist cut. Glass was the main agent inflicting the injury (58.7%) and wrist injuries were...
common in our group (62.8%). Most of the patients reported on the day when the injury took place. Majority of the patients had absent all sensory modalities (98.7%) and motor deficit due to loss of adductor function of the thumb and wrist drop was noted in 53.3% of the patients. The patients were explored under general anesthesia and cut ends of the nerve were identified. For some of the patients who reported late, in addition to the clinical examination, nerve conduction velocity and electro-myography also added in the preoperative diagnosis of the injured nerve. Median nerve (33%) and ulnar nerve (32%) were the most frequently injured nerves in our patients. Epineural microsurgical repair was carried out in majority of our patients under loop magnification with nylon 8-0 sutures. Three patients had a significant gap between the divided ends of the nerve and these were repaired using sural nerve cable grafts. Postoperatively the patients were assessed for the restoration of sensory modalities and the degree of motor recovery on subsequent follow-ups.

<table>
<thead>
<tr>
<th>Motor grade</th>
<th>Level of recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>M0</td>
<td>No recovery</td>
</tr>
<tr>
<td>M1</td>
<td>Perceivable contraction in proximal muscles</td>
</tr>
<tr>
<td>M2</td>
<td>Perceivable contraction in proximal and distal muscles</td>
</tr>
<tr>
<td>M3</td>
<td>Contraction possible against gravity</td>
</tr>
<tr>
<td>M4</td>
<td>Contraction possible against resistance</td>
</tr>
<tr>
<td>M5</td>
<td>Full recovery in all muscles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensory grade</th>
<th>Level of recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>No recovery</td>
</tr>
<tr>
<td>S2</td>
<td>Recovery of deep cutaneous sensibility</td>
</tr>
<tr>
<td>S3</td>
<td>Recovery of superficial pain and sensibility</td>
</tr>
<tr>
<td>S4</td>
<td>Recovery of superficial pain and some touch</td>
</tr>
<tr>
<td>S5</td>
<td>S2 recovery with hypersensitivity</td>
</tr>
<tr>
<td>S6</td>
<td>Recovery of pain and touch without hypersensitivity</td>
</tr>
<tr>
<td>S7</td>
<td>S3 recovery with localization and some two-point discrimination</td>
</tr>
<tr>
<td>S8</td>
<td>Complete recovery with normal two-point discrimination</td>
</tr>
</tbody>
</table>

**Figure 1:** Demonstrating inflicting agent

**Figure 2:** Showing frequency of reconstruction technique

**Figure 3:** Showing overall sensory recovery

**Figure 4:** Showing overall motor recovery

**Results**

The results were evaluated as per the Height scale adopted by British Medical Council grading system for sensory and motor recovery.
In our patients, at 27 months of follow up, we achieved, $S_2$, sensory recovery in 6.3% of the patients, $S_3$ in 18.8%; $S_2$, in 25%, $S_3$ in 31.3% and $S_1$ in 18.8% of the patients. Selma et al.\(^{13}\) observed at mean follow up of 5 years; $S_2$, sensory recovery in 35.7% of their patient, $S_3$, in 28.5%, $S_1$, in 4.2%, $S_2$, in 7.14%, $S_3$, in 10.7% and $S_1$ in 3.5% of their patients. Daoutis et al.\(^{10}\) observed at mean follow up of 26 months, results for median nerve repair were: $S_2$, recovery in 8.5%, $S_3$, in 42.5%, $S_1$, in 36.5%, $S_2$, in 39%, $S_1$ in 12% of their patients. In terms of motor recovery, $M_2$, motor restoration was noted in 62.5% of the patients, $M_3$, in 18.8%, $M_1$, in 12.5% and $M_2$, in 9.3% of the patients. Daoutis et al.\(^{10}\) reported $M_1$, recovery in 51% of their patients of median nerve injury, $M_2$, in 17% and $M_3$, in 31.9% at 26 months of follow up. For ulnar nerve injuries, their motor recovery was $M_1$, in 70.7%, $M_2$, in 14.6% and $M_3$, in 14.6%. When we compared the results with the world literature,\(^{10,13,15}\) we found that we had excellent results in 50% of the patients, good in 37.5% and fair in 12.5% of our patients.

**Discussion**

Microsurgical nerve repair has got revolutionized in the recent past following considerations given to the level and extent of injury, technical skill and strategy employed by the surgeon and the physiologic or pathologic milieu of the patient and the injury. Suspected open nerve injuries, in which an open wound is accompanied by an anatomically appropriate neurologic deficit, mandate timely but not emergent exploration. However, if the nerve is intact on exploration, management proceeds according to the protocol for closed injuries. Proximal vs distal injuries also play a role in predicting the outcome. In our series of patients, the experience in terms of outcome was comparable with the worldwide literature taking all the above
criteria into consideration.

Glass, the main offending agent in our patients, inflicts substantial damage to the underlying nerves beneath the skin wound.

Furthermore, our group of patients were mostly students and therefore, were probably not experienced in handling the causative agent properly. The skin wounds harbour severe underlying nerve injuries and early exploration of the wound aids in identifying the damage. This too has been supported by the literature whereby the patients have been explored under general anaesthesia to look for underlying nerve damage.

Epineural microsurgical repair offers good results in an emergency setting where the time factor has to be born in mind. Use of magnifying loop, micro instruments and micro sutures have a definite role in the outcome. Whenever the defect is >5cm or when excessive traction is required to approximate the divided ends of the nerve, grafting becomes necessary. In our patients we used sural nerve in the form of cable grafts to bridge the gaps as also has been reported.

We used the Higset scale for the assessment of the recovery. We were able to achieve upto S, and S, sensory recovery and upto M, and M, motor recovery in those patients who completed 27 months of the follow-up. Selma et al report upto S, and S, recovery in their patients, but their follow-up was for a longer time than ours. Further, our patients are still recovering and better results are expected as they are being continuously followed-up.

Conclusions

We thus concluded that for small looking glass cut wounds, the injury must not be underestimated from the description of the wound only and thorough exploration should be done to identify the underlying peripheral nerve injury. Timely address should be made to repair the damaged nerve making full use of the surgical skill, instrumentation and magnification. Further the epineural nerve repair for these clean cut nerve lacerations gives excellent results.

References

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