

# Iatrogenic peripheral nerve injury

## Treatment

Iatrogenic [peripheral nerve injury](#) is a considerable social and economic concern and the majority of cases are preventable. Complications should be referred to and dealt with promptly by experienced surgeons, to ensure the best chances for optimal functional recovery. Their prevention should be emphasized. Their management should include ensuring early diagnosis, administering an appropriate treatment with rehabilitation, rendering psychological support, and providing control of pain <sup>1)</sup>.

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The combination of morphological assessment (neurosonography) with functional assessment (nerve conduction studies) is of paramount importance in the management of traumatic peripheral nerve injuries. If on sonography, the nerve appears intact, then intraoperative nerve conduction studies the functionality of the nerve. If conduction is impaired (signifying the presence of a neuroma-in-continuity), then nerve grafting is done. If the conduction is somewhat preserved, neurolysis is performed <sup>2)</sup>.

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If it is noted during an operation that a nerve has been severed, it should be repaired immediately during the same operation (primary repair) or within 2–3 weeks (early secondary repair) <sup>3)</sup>.

The same is true when the nerve is torn or damaged but not cleanly cut. The same operative approach is used as for any other nerve injury. The repair ideally is done with microsurgical tools and magnifying devices, insuring maximal visualization for the repair.

Once again, this ideal situation with the immediate repair is seldom achieved. Usually, the cause of the damage is unknown. In our experience, the operative report rarely provides useful information. When the mechanism for the damage is unknown but there is reason to think that the nerve may regenerate itself, we prefer to wait 3 months with monthly neurological examinations. If at this time, the deficit has not changed or only minimally improved, the nerve should be surgically explored in the next month. If the neurosonographic examination after exposure of the nerve identifies a neuroma, one should not delay. The operation should ideally occur within 3 weeks <sup>4)</sup>.

A severed nerve should be reconstructed, if possible. Usually, this requires nerve grafting. The sural nerve on the lateral calf is usually used as a source. Other cutaneous nerves such as the saphenous nerve and the medial antebrachial cutaneous nerve can also be used <sup>5)</sup>. If the nerve appears to be intact, then intraoperative nerve conduction studies help assess how functional it is in the area of damage. If conductivity is impaired, then the affected segment of the nerve surrounded by scar tissue—usually thickened and diagnosed as a neuroma in continuity—is excised and replaced by a transplant. In other cases, when conductivity studies are more promising, it suffices to free the nerve up from the surrounding reactive tissues (neurolysis). In recent years intraoperative neurosonography has been employed, facilitating the evaluation of individual nerve fascicles, helping distinguish between a complete neuroma in continuity without any residual fascicles and a partial lesion still containing functioning fascicles <sup>6)</sup>.

The combination of the functional evaluation (nerve conduction studies) and the morphologic assessment (neuro sonography) is very helpful in the surgical management of traumatic injuries in peripheral nerve surgery. The exact approach is documented in the interdisciplinary guidelines of the AWMF "Versorgung peripherer Nervenverletzungen" <sup>7)</sup>.

A key factor in improving the prognosis is physical therapy, both after the deficit is identified and then post-operatively until re-innervation of the affected muscles has occurred. Electric stimulation therapy is also worthwhile in our option. In this way, the muscle structures can be better maintained until nerve regeneration has occurred.

## Case series

Dubuisson et al. analyzed the [management](#) of iatrogenic [peripheral nerve injury](#) (iNI) in 42 [patients](#).

The iNI occurred mostly during a surgical [procedure](#) (n = 39), either on a nerve or [plexus](#) (n = 13), on [bone](#), joint, vessel, or soft tissue (n = 24) or because of malpositioning (n = 2). The most commonly injured nerves were the [brachial plexus](#), [radial nerve](#), [sciatic nerve](#), [femoral nerve](#), or [peroneal nerves](#). 42.9% of the patients were referred to later than 6 months. A neurological deficit was present in 37 patients and neuropathic pain in 17. Two patients were lost to follow-up. Conservative treatment was applied in 23 patients because of good spontaneous recovery or compensation or because of expected bad prognosis whatever the treatment. Surgical treatment was performed in 17 patients because of known nerve section (n = 2), persistent neurological deficit (n = 12) or invalidating neuropathic pain (n = 3); nerve reconstruction with grafts (n = 8) and neurolysis (n = 8) were the most common procedures. The outcome was satisfactory in 50%. Potential reasons for poor outcomes were a very proximal injury, placement of very long grafts, delayed referral, and predominance of neuropathic pain. According to the [literature](#), delayed referral of iNI for treatment is frequent. They provides an illustrative case of a young girl operated on at 6.5 months for femoral nerve reconstruction with grafts while the nerve section was obvious from the operative note and pathological tissue analysis. Litigation claims (n = 10) resulted in malpractice (n = 2) or therapeutic area (n = 5) (3 unavailable conclusions).

NI can result in considerable disability, pain, and [litigation](#). Optimal management is required <sup>8)</sup>.

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Rasulić et al. describe and analyze iatrogenic nerve injuries in a total of 122 consecutive patients who received surgical treatment at there institution during a period of 10 years, from January 1, 2003, to December 31, 2013. The final outcome evaluation was performed 2 years after surgical treatment.

The most common causes of iatrogenic nerve injuries among patients in the study were the operations of bone fractures (23.9%), lymph node biopsy (19.7%), and carpal tunnel release (18%). The most affected nerves were median nerve (21.3%), accessory nerve (18%), radial nerve (15.6%), and peroneal nerve (11.5%). In 74 (60.7%) patients, surgery was performed 6 months after the injury, and in 48 (39.3%) surgery was performed within 6 months after the injury. In 80 (65.6%) patients, we found lesion in discontinuity, and in 42 (34.4%) patients lesion in continuity. The distribution of surgical procedures performed was as follows: autotransplantation (51.6%), neurolysis (23.8%), nerve transfer (13.9%), direct suture (8.2%), and resection of neuroma (2.5%). In total, we achieved satisfactory recovery in 91 (74.6%), whereas the result was dissatisfactory in 31 (25.4%) patients.

Patients with iatrogenic nerve injuries should be examined as soon as possible by experts with experience in traumatic nerve injuries so that the correct diagnosis can be reached and the appropriate therapy planned. The timing of reconstructive surgery and the technique used are the crucial factors for functional recover <sup>9)</sup>.

340 patients underwent surgery for iatrogenic nerve injuries over a 23-year period in the District Hospital of Günzburg (Neurosurgical Department of the University of Ulm). In a study published by the authors in 2001, 17.4% of the traumatic nerve lesions treated were iatrogenic. 94% of iatrogenic nerve injuries occurred during surgical procedures <sup>10)</sup>.

## References

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Last update: 2024/06/07 02:56



