ORIGINAL ARTICLE

Evaluation of traumatic peripheral nerve injuries in terms of Forensic Medicine

Emre Gürkan Bulutluöz,[1] Hüseyin Balandız,[2] Sait Özsoy[2]

[1]Department of Forensic Medicine, Çankırı State Hospital, Çankırı-*Türkiye*

[2]Department of Forensic Medicine, University of Health Sciences Gulhane Faculty of Medicine, Ankara-*Türkiye*

ABSTRACT

BACKGROUND: Traumatic peripheral nerve injuries are one of the leading causes of disability in young individuals. This study aims to evaluate cases of traumatic peripheral nerve injury from a forensic medical perspective and to identify their characteristic features.

METHODS: A retrospective analysis was conducted on 6,953 cases who presented to the Forensic Medicine Clinic of Gülhane Training and Research Hospital between September 1, 2016 and June 31, 2023. Among these, 393 cases with traumatic peripheral nerve injuries were included in the study. The age, gender, occupation, cause of trauma, scope of the legal case, injured peripheral nerves, associated bone fractures, muscle strength and sensory loss, functional recovery status, psychiatric diagnosis, and electromyography (EMG) results of the cases were examined. All medical reports of the cases were evaluated within the scope of relevant legal regulations.

RESULTS: This study analyzed 393 cases with ages ranging from 17 to 70 years (mean age: 28.2 years). Of these, 94.9% were security personnel. The most common causes of injury were explosive devices and firearm injuries. The most frequently damaged nerves were the peroneal, ulnar, and tibial nerves. According to EMG findings, partial axonal degeneration was detected in 82.79% of the injured nerves, while total axonal degeneration was identified in 17.21%. Injuries were most commonly observed in the elbow-forearm region. Full functional recovery was noted in 5.1% of the cases. Bone fractures, particularly in the knee-leg region, were present in 73.3% of the cases. Psychiatric disorders developed in 22.1% of the cases. Injuries were deemed permanent in 94.5% of the cases, and re-evaluation was required in 60.7% of the cases after 18 months post-injury. Permanent disability was identified in 94.9% of the cases.

CONCLUSION: A detailed forensic evaluation of traumatic peripheral nerve injuries was conducted, highlighting their frequent occurrence in military conflict zones. A meticulous assessment of symptoms resulting from these injuries is necessary. Electromyography findings are effective in evaluating nerve injuries and should be integrated with physical examinations.

Keywords: Forensic medicine; nervous system; trauma.

INTRODUCTION

In humans, the nervous system is divided into the central nervous system (CNS) and the peripheral nervous system (PNS). The CNS comprises the brain, brainstem, and spinal cord, whereas the PNS includes spinal and cranial nerves, ganglia, and other nerve tissues.[1]

Traumatic peripheral nerve injuries are significant causes of disability, particularly among young individuals. The incidence of such injuries is approximately 3%, and when plexus and spinal root injuries are included, this rate increases to 5%.[2]

The etiology primarily involves penetrating traumas such as gunshot wounds and stab injuries, motor vehicle accidents, industrial accidents, and stretch and crush injuries resulting from falls.[3]

Cite this article as: Bulutöz EG, Balandız H, Özsoy S. Evaluation of traumatic peripheral nerve injuries in terms of Forensic Medicine. Ulus Travma Acil Cerrahi Derg 2025;31:269-275.

Address for correspondence: Emre Gürkan Bulutluöz

Department of Forensic Medicine, Çankırı State Hospital, Çankırı, Türkiye

E-mail: gbulutluoz@yahoo.com.tr

Ulus Travma Acil Cerrahi Derg 2025;31(3):269-275 DOI: 10.14744/tjtes.2024.73076

Submitted: 08.10.2024 Revised: 10.10.2024 Accepted: 06.11.2024 Published: 03.03.2025

The mode and duration of recovery depend on the type of injury, the distance to the target organ, and the contributions of three possible recovery models: remyelination, collateral sprouting, and axonal regeneration. Typically, the conduction block heals the fastest, generally within 6-8 weeks. However, in cases of severe axonal loss or complete loss of nerve continuity, recovery is not complete before 12-18 months.[4]

This study aims to evaluate peripheral nerve injuries caused by traumatic events, which are subjects of criminal and/or compensation law, from a forensic medical perspective and to delineate their characteristic features. Trauma-induced injuries are frequently assessed within the scope of forensic medical practice, and understanding the characteristics of these injuries is crucial for the correct approach to cases.

MATERIALS AND METHODS

A retrospective analysis was conducted on 6,953 cases who applied to the Forensic Medicine Clinic of Gülhane Training and Research Hospital between September 1, 2016 and June 31, 2023, requesting reports for criminal or compensation law purposes. Among these, 393 cases with traumatic peripheral nerve injuries were included in the study.

The age, gender, occupation, cause of trauma, scope of the lawsuit, injured peripheral nerves, accompanying bone fractures, muscle strength loss, sensory loss, functional recovery status, psychiatric diagnoses post-injury, and post-injury electromyography (EMG) results of the cases were examined.

This study was conducted with the approval of the Gülhane Training and Research Hospital Ethics Committee for Scientific Research, under decision number 2023-314 dated August 22, 2023.

Statistical Analysis

The data obtained from the research were entered into the IBM Statistical Package for the Social Sciences (SPSS) Statistics version 26.0 (IBM SPSS Statistics for Windows, IBM Corp., Armonk, New York, USA) for statistical analysis. Descriptive statistics used in the statistical analyses included frequencies and percentages for qualitative data and arithmetic mean ± standard deviation (SD) for normally distributed quantitative data. For statistical evaluation of the data:

• The Chi-Square test was used for relationships between categorical variables.

• Student's t-test was used for comparisons between two groups of normally distributed quantitative variables.

• One-Way analysis of variance (ANOVA) and Bonferroni test were used for multiple group comparisons of normally distributed quantitative variables.

• Mann-Whitney U test was used for comparisons between two groups of non-normally distributed quantitative variables.

• Kruskal-Wallis one-way ANOVA was used for multiple group comparisons of non-normally distributed quantitative variables.

A significance level of $p<0.05$ was accepted as statistically significant.

RESULTS

Among the cases that applied to our clinic, the prevalence of traumatic peripheral nerve injury was found to be 5.65%.

Of the cases included in the study, 99.5% (n=391) were male, with an average age of 28.20±6.46 years. The highest number of cases was observed in the 26-35 age group (n=222, 56.5%).

Regarding occupational distribution, 91.9% (n=361) were military personnel, 5.1% (n=20) were civilians, 1.5% (n=6) were security guards, 1.3% (n=5) were police officers, and 0.3% (n=1) were correctional officers.

A total of 92.4% (n=363) of the cases applied with a request for a report as the basis for cash compensation payment, 6.6% (n=26) applied with a request for a definitive report for a criminal case, and 1% (n=4) applied with a request for a disability report for a compensation lawsuit.

The average time between the injury and application to our clinic was 385.18±217.88 days. This period was 290.42±251.12 days for cases applying for a criminal case report and 397.46±206.36 days for those applying for a compensation law report.

The most common etiological causes were explosive injuries (45.8%, n=180), gunshot injuries (42.5%, n=167), and traffic accidents (5.1%, n=20) (Fig. 1).

When traumatic etiologies were analyzed according to professions, explosive injuries were most common among military personnel (48.5%, n=175), stab injuries were most common among civilians (40%, n=8), and gunshot injuries were most common among police officers (60%, n=3).

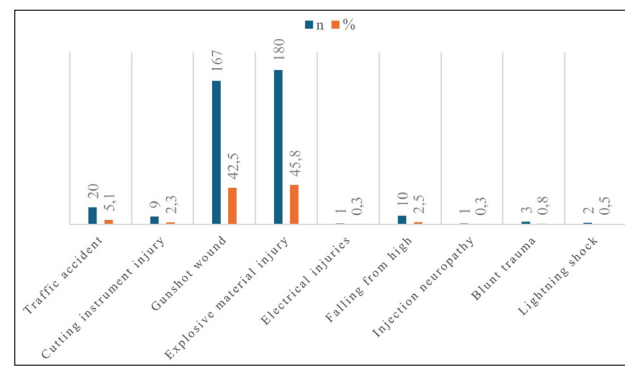

Figure 1. Distribution of cases by etiological causes.

Table 1. Frequency of peripheral nerve injuries

	n	%		n	%
Peroneal Nerve	123	20.95	Sural Nerve	9	1.53
Ulnar Nerve	95	16.18	Musculocutaneous Nerve	5	0.85
Tibial Nerve	91	15.50	Facial Nerve	5	0.85
Radial Nerve	72	12.27	Gluteal Nerve	3	0.51
Median Nerve	68	11.58	Obturator Nerve	3	0.51
Femoral Nerve	24	4.09	Superficial Peroneal Nerve	2	0.34
Sciatic Nerve	24	4.09	Saphenous Nerve	2	0.34
Brachial Plexus	22	3.75	Femoral Cutaneous Nerve	2	0.34
Axillary Nerve	15	2.56	Medial Plantar Nerve	1	0.17
Lumbosacral Plexus	10	1.70	Accessory Nerve	1	0.17
Suprascapular Nerve	9	1.53	Marginal Nerve	1	0.17

Table 2. Peripheral nerve injury locations in cases

	n	%
Peripheral Nerve Injury Locations in Cases		
Shoulder-Arm	62	15.8
Elbow-Forearm	90	22.9
Hand-Wrist	26	6.6
Hip-Thigh	77	19.6
Knee-Leg	88	22.4
Foot-Ankle	25	6.4
Head-Neck	4	1.0
Multiple Regions	21	5.3

A total of 587 traumatic peripheral nerve injuries were identified in 393 cases, with the most frequently injured nerves being the peroneal nerve (20.95%, n=123), ulnar nerve (16.18%, n=95), tibial nerve (15.5%, n=91), radial nerve (12.27%, n=72), and median nerve (11.58%, n=68) (Table 1).

When EMG findings were analyzed, partial axonal degeneration was observed in 82.79% (n=486) of the injured nerves, while total axonal degeneration was identified in 17.21% (n=101). Among cases with partial axonal degeneration, injuries were classified as mild in 23.68% (n=139), moderate in 25.72% (n=151), and severe in 33.39% (n=196).

In 60.6% (n=238) of the cases, a single nerve was injured; in 31% (n=122) two nerves were injured; and in 8.4% (n=33) three or more nerves were injured. The most common multiple nerve injuries involved the peroneal and tibial nerves (37.7%, n=58), the median, radial, and ulnar nerves (13.6%, n=21), and the ulnar and median nerves (10.4%, n=16).

Peripheral nerve injuries were most frequently localized in the elbow-forearm region (22.9%, n=90), followed by the knee-leg region (22.4%, n=88), hip-thigh region (19.6%, n=77), and shoulder-arm region (15.8%, n=62) (Table 2).

Sensory loss was observed in 71% (n=279) of the cases, and muscle strength loss occurred in 92.6% (n=364), both of which were permanent. Despite evidence of axonal degeneration on EMG, 5.1% (n=20) of cases demonstrated no sensory or muscle strength loss and achieved functional recovery.

All cases with functional recovery exhibited partial axonal

Table 3. Comparison of functional recovery with the number of injured nerves

	Functional Recovery					
	Available		Not Available			
	n	%	n	%	Chi-Square	p
Number of Injured Nerves						
1	19	8.0	219	92.0	10.501	0.005*
2	1	0.8	121	99.2		
3+	0	0.0	33	100.0		

Table 4. Incidence of trauma-induced psychiatric disorders in cases

		n	%
Without a Psychiatric Diagnosis		306	77.9
Psychiatric Diagnosis	Anxiety Disorder	79	20.1
	Post-Traumatic Stress Disorder (PTSD)	6	1.5
	Major Depression	2	0.5
Total		393	100

degeneration, and 95% involved a single nerve injury. The highest rates of recovery were observed in the 26-35 age group. A statistically significant relationship was found between the number of injured nerves and full functional recovery ($p<0.05$). None of the cases with three or more nerve injuries achieved full functional recovery (Table 3).

In 72.8% (n=286) of the cases, peripheral nerve injury was accompanied by one or more bone fractures. These fractures most commonly occurred in the knee-leg region (14.5%, n=57), followed by elbow-forearm (13.5%, n=53), hip-thigh (12.2%, n=48), shoulder-arm (8.2%, n=32), hand-wrist (5.9%, n=23), foot-ankle (5.9%, n=23), and multiple regions (11.7%, n=46).

Peripheral nerve injuries accompanied 90.0% of fractures in the shoulder-arm region, 94.1% in the elbow-forearm, 76.2% in the hand-wrist, 85.1% in the hip-thigh, 96.4% in the knee-leg, and 82% in the foot-ankle regions.

It was found that 22.1% (n=87) of the cases were diagnosed with a psychiatric disorder following the injury. Of these, 90.8% (n=79) were diagnosed with anxiety disorder, 6.9% (n=6) with post-traumatic stress disorder (PTSD), and 2.3% (n=2) with major depression (Table 4).

When evaluating the decisions regarding the injuries of 365 cases that applied for a report for cash compensation, it was determined that 94.5% (n=345) had a sequela, 4.9% (n=18) did not have a sequela, and 0.6% (n=2) required re-examination after 18 months. For the 28 cases that applied for a report for criminal law purposes, it was determined that in 60.7% (n=17), a decision could be made after an examination 18 months post-injury; in 17.9% (n=5), the functional impairment of one of their senses was permanent; and in 17.9% (n=5), the loss of function in one of their senses was complete (Table 5).

Cases not requiring examination 18 months post-injury (n=374) were evaluated under the scope of the Regulation on Determination of the Rate of Loss of Working Power and Earning Power in the Profession[5] and the Regulation on Disability Assessment for Adults.[6] It was determined that 94.9% (n=355) had sequela constituting a disability rate according to both regulations (Table 5).

DISCUSSION

Traffic accidents, incidents of violence, injuries resulting from the widespread use of firearms, and injuries caused by explosive materials are among the primary causes of traumatic injuries both globally and in our country. These issues are further exacerbated by increasing urban population and advancing industrialization.[7,8] The rise in these traumatic incidents can cause significant damage to various parts of the human body, including traumatic peripheral nerve injuries.

Traumatic peripheral nerve injuries are a significant cause of disability worldwide, and their actual incidence is higher than reported.[2] Studies[3,9,10] have indicated an incidence rate ranging from 1.3% to 5%. In our center, the rate was found to be 5.65%. The inclusion of plexus injuries in our study contributed to this rate exceeding 5%.

Traumatic peripheral nerve injuries are more common in males. Similar studies[9,11-14] have reported that 71-100% of the cases are male. In our study, the gender distribution was consistent with these findings, with 99.5% of the cases be-

Table 5. Evaluation of nerve injuries in cases analyzed within the scope of regulations

		n	%
Whether the Injury Constitutes a Sequela	Sequela	345	94.5
	Does Not Constitute a Sequela	18	4.9
	To Be Examined After 18 Months	2	0.6
Whether the Injury Leads to Permanent Weakening or Loss of Function of Any Sense or Organ	Loss of Function	5	17.9
	Weakening of Function	5	17.9
	No Loss or Weakening of Function	1	3.6
	To Be Examined After 18 Months	17	60.7
Whether the Injury Results in a Disability Rating	Results in a Disability Rating	355	94.9
	Does Not Result in a Disability Rating	19	5.1

ing male. We believe this is due to the higher prevalence of traumatic injuries among males[15] and, consequently, a similar distribution in traumatic peripheral nerve injuries.

Traumatic peripheral nerve injuries are frequently observed in the young age group. The impact on this highly productive demographic results in a reduction in workforce capacity.[12,14] A study comparing traumas with and without nerve injuries has found that the average age of traumatic cases with nerve injuries is significantly lower.[9] The literature [9,12,14,16-18] reports an average age of 27-37 years for cases of traumatic peripheral nerve injuries. Consistent with the literature, our study found the average age to be 28.2 years, with 56.5% of the cases falling within the 26-35 age range.

The profession of individuals is recognized as a direct or indirect factor in the occurrence of traumatic peripheral nerve injuries. In civilian cases, traumatic peripheral nerve injuries generally result from traffic accidents, workplace incidents, home accidents, penetrating traumatic events, ischemia, and, more rarely, thermal, electrical, and vibration traumas.[19] Among security forces, particularly during periods of heightened warfare or conflict, the incidence of traumatic peripheral nerve injuries increases, with severe injuries being more common and often caused by gunshot wounds.[20, 21] In our study, 94.9% of the cases involved members of the security forces, including military personnel, police officers, security guards, and correctional officers. The low rate of civilian injuries can be attributed to the high number of applications from security forces seeking reports under the Cash Compensation Regulation during the provision of internal and external security and the higher incidence of traumatic peripheral nerve injuries in this population compared to civilians.

Many studies[2,14,18,22] report that traumatic peripheral nerve injuries most commonly result from gunshot wounds and explosive injuries, while some studies[9,11,13] indicate traffic accidents, and others, such as the study by Uzun et al.,[22] identify stab injuries as the primary cause. In our research, the most common etiological causes were explosive injuries (45.8%) and gunshot injuries (42.5%). Explosive materials are frequently used in terrorist actions due to their ease of manufacture and the extensive damage they cause. Firearms are also widely used in such actions. The prevalence of explosive injuries as the most common etiological cause in our study is likely related to the predominantly military personnel population in our hospital.

It was observed that the average time between injury and application to our clinic was 290.42 days for cases applying for a criminal case report and 397.46 days for those applying for a compensation law report. In criminal law, the nature of the injuries needs to be reported promptly to initiate the legal process. In contrast, in compensation law, the full scope and consequences of the injury must be determined, requiring the completion of the healing processes. This difference reflects the primary goals and operational principles of the respective legal fields.

Although most studies[14,17] report that the peroneal nerve is the most commonly injured peripheral nerve, Bulut et al.[16] identify the sciatic nerve, and Uzun et al.[22] report the ulnar nerve as the most frequently injured. In our research, consistent with most studies in the literature, we found the peroneal nerve to be the most frequently injured.

Similar studies[3,9,11,13,17] have reported that peripheral nerve injuries are more common in the upper extremity (60-80%), while one study[12] found more nerve damage in the lower extremity. In contrast to the general literature, our research found that 48.35% of injuries occurred in the lower extremity and 45.29% in the upper extremity. When the extremities were analyzed by region, the most commonly affected areas were the elbow-forearm (22.9%), knee-leg (22.4%), hip-thigh (19.6%), and shoulder-arm (15.8%). We believe the higher incidence of lower extremity injuries in our study, contrary to similar studies, is due to the high prevalence of explosive injuries among the cases examined, the widespread use of landmines, and the resultant prominence of lower extremity injuries.

The degree of axonal degeneration in peripheral nerve injuries significantly affects the prognosis.[23] Studies[11-14,18] report total axonal degeneration in 13.7% to 35.2% of traumatic peripheral nerve injuries. Consistent with the literature, we found total axonal degeneration in 17.21% of the injured peripheral nerves. However, the fact that EMG studies in our research were conducted at different time intervals post-trauma and that control EMG studies were not included may have led to an underestimation of the severity of peripheral nerve injuries.

The recovery of sensory function depends on mechanisms distinct from those involved in motor function recovery. Following axonal injury, the sensory region undergoes redistribution, with intact fibers innervating a larger area than before.[24] An important distinction between sensory recovery and motor function recovery is that end organs, such as muscles, do not degenerate 18 to 24 months after injury. As a result, sensory recovery can continue for a longer period than motor recovery. In our study, sensory loss was identified in 71% of cases, while muscle strength loss was found in 92.6%. We believe the disparity between cases with muscle strength loss and those with sensory loss reflects the differing recovery mechanisms of sensory and motor functions.

Dunn et al.[18] reported functional recovery in 2.2% of cases who underwent nerve graft or primary repair surgery following traumatic peripheral nerve injury. In our study, full functional recovery was observed in 5.1% of cases. We believe the higher rate in our study is due to the inclusion of mild injuries that did not require surgical repair among the cases examined. Additionally, a significant statistical relationship was found between the number of injured nerves and functional recovery ($p<0.05$), with none of the cases involving three or

more nerve injuries achieving functional recovery.

Pannell et al.[25] examined patients with upper extremity injuries and surgical exploration following gunshot wounds, reporting nerve damage in 60% of patients with fractures. Similarly, many studies[14,17,18] report that 31.1% to 68.9% of nerve injuries occur in conjunction with bone fractures. In our study, it was found that 73.3% of cases had associated bone fractures alongside peripheral nerve injuries.

Traumatic peripheral nerve injuries result from severe traumatic events and adversely impact individuals' physical and psychological health. Ultee et al.[26] reported that 24.6% of patients with traumatic peripheral nerve injuries exhibited symptoms necessitating psychological treatment one month post-surgery. Similarly, in our study, 22.1% of cases were diagnosed with a psychiatric disorder following the trauma. As highlighted in the literature, the occurrence of psychiatric disorders among individuals who have experienced severe traumatic events and witnessed injuries sustained by their peers is an expected outcome.

In our study, it was determined that 94.9% of the cases evaluated under the Regulation on Determination of the Rate of Loss of Working Power and Earning Power in the Profession[5] and the Regulation on Disability Assessment for Adults[6] had sequelae that constituted a disability rate under both regulations. It is important to note that the same injuries may yield different disability rates depending on the regulations used for calculation.[27]

CONCLUSION

In conflict zones, the use of armored protective equipment, advancements in field medical care, and efficient evacuation systems for the wounded have increased survival rates for individuals who might not have survived previously. However, this has also led to a rise in severe traumatic sequelae. The military medical system focuses on the safe transportation of injured individuals to higher-level care centers after stabilization. This approach enhances survival rates and helps preserve the function of injured limbs; however, it can result in milder injuries being overlooked. To address this, developing a standard checklist for detailed evaluation of peripheral nerves can facilitate the early diagnosis of traumatic peripheral nerve injuries sustained in conflict zones and explosion incidents. This checklist should also be designed for easy transfer between different treatment centers. Assessing peripheral nerve function during physical examinations can help prevent the loss of early treatment opportunities. Furthermore, maintaining accurate records of the initial injury is crucial to avoid misjudgment about the nature of the traumatic injury, which could lead to losses of rights in both compensation and criminal law contexts.

Electromyography is an extremely effective tool for determining the type and degree of nerve damage and can be used to predict the course of the injury and potential recovery. However, even if EMG results indicate chronic peripheral nerve damage, a careful evaluation of motor and sensory function pathologies caused by the peripheral nerve damage should be performed during physical examination. If an individual's motor and sensory functions are normal, the forensic report should clearly state that the injury does not constitute a permanent disability. Otherwise, incorrect assessments can exacerbate the victim's suffering or expose offenders to more severe charges.

When peripheral nerve damage results from a traumatic injury, assessments under criminal law should determine whether the injury has caused permanent weakening or loss of function in one of the person's senses or organs. To accurately assess this, the healing period for peripheral nerves, which lasts 18 months, should be observed. This period is essential for evaluating the long-term effects of the injury and determining permanent functional loss.

Considering that individuals experiencing traumatic events may suffer functional loss in their extremities due to peripheral nerve injuries, which can affect their mental health, psychiatric evaluations should be included in examinations. This approach allows for a more comprehensive assessment of the nature of the person's injury. It is also important to note that psychological sequelae are recognized in the regulations used to evaluate the nature of injuries.

Ethics Committee Approval: This study was conducted with the approved by the University of Health Sciences, Gülhane Ethics Committee for Scientific Research with the (Date: 22.08.2023, Decision No: 2023-314).

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: E.G.B, H.B., S.Ö.; Design: E.G.B, H.B., S.Ö.; Supervision: E.G.B, H.B., S.Ö.; Resource: E.G.B.; Materials: E.G.B, H.B.; Data collection and/or processing: E.G.B.; Analysis and/or interpretation: E.G.B., S.Ö.; Literature review: E.G.B.; Writing: E.G.B.; Critical review: E.G.B, H.B., S.Ö.

Conflict of Interest: None declared.

Financial Disclosure: The author declared that this study has received no financial support.

REFERENCES

1. Standring S. Gray's anatomy e-book: the anatomical basis of clinical practice. 42nd ed. Elsevier Health Sciences; 2021. [CrossRef]
2. Robinson LR. Traumatic injury to peripheral nerves. Muscle Nerve 2022;66:661-70. [CrossRef]
3. Noble J, Munro CA, Prasad VS, Midha R. Analysis of upper and lower extremity peripheral nerve injuries in a population of patients with multiple injuries. J Trauma 1998;45:116-22. [CrossRef]
4. Wilbourn AJ. Nerve conduction studies. Types, components, abnormalities, and value in localization. Neurol Clin 2002;20:305-38, v. [CrossRef]
5. Republic of Turkey Ministry of Labor and Social Security. Regulation on the Procedures for Determining Work Force and Occupational Earning Capacity Loss Rate. Ankara: Official Gazette; 11 October 2008. Available from: https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=12511&

MevzuatTur=7&MevzuatTertip=5 [CrossRef]
6. Republic of Turkey Ministry of Health. Regulation on Disability Assessment for Adults. Ankara: Official Gazette; 20 February 2019. Available from: https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=31275&MevzuatTur=7&MevzuatTertip=5 Accessed Dec 1, 2023. [CrossRef]
7. Karasu A, Sabanci PA, Cansever T, Hepgül KT, Imer M, Dolaş I, et al. Epidemiological study in head injury patients. Ulus Travma Acil Cerrahi Derg 2009;15:159-63. Turkish. [CrossRef]
8. Peleg K, Aharonson-Daniel L, Stein M, Michaelson M, Kluger Y, Simon D, et al.; Israeli Trauma Group (ITG). Gunshot and explosion injuries: characteristics, outcomes, and implications for care of terror-related injuries in Israel. Ann Surg 2004;239:311-8. [CrossRef]
9. Saadat S, Eslami V, Rahimi-Movaghar V. The incidence of peripheral nerve injury in trauma patients in Iran. Ulus Travma Acil Cerrahi Derg 2011;17:539-44. [CrossRef]
10. Selecki BR, Ring IT, Simpson DA, Vanderfield GK, Sewell MF. Trauma to the central and peripheral nervous systems. Part II: A statistical profile of surgical treatment New South Wales 1977. Aust N Z J Surg 1982;52:111-6. [CrossRef]
11. Eser F, Aktekin LA, Bodur H, Atan C. Etiological factors of traumatic peripheral nerve injuries. Neurol India 2009;57:434-7. [CrossRef]
12. Miranda GE, Torres RY. Epidemiology of Traumatic Peripheral Nerve Injuries Evaluated with Electrodiagnostic Studies in a Tertiary Care Hospital Clinic. PR Health Sci J 2016;35:76-80. [CrossRef]
13. Kouyoumdjian JA. Peripheral nerve injuries: a retrospective survey of 456 cases. Muscle Nerve 2006;34:785-8. [CrossRef]
14. Örücü Atar M, Kalem Özgen AN, Kılınç Kamacı G, Özcan F, Demir Y, Öztürk Küçükşahin N, et al. Travmatik Periferik Sinir Yaralanmaları: 328 Vakanın Retrospektif Analizi. JPMRS 2023;26:436-42. [CrossRef]
15. Balandız H, Aydogan HC, Kaya B, Özsever S, Özsoy S. Comprehensive examination of etiological factors and clinical manifestations of maxillofacial traumas in forensic cases: A five-year retrospective study. Ulus Travma Acil Cerrahi Derg 2024;30:677-84. Eng [CrossRef]
16. Bulut G, Aksu S, Türk Börü Ü. Travmatik periferik sinir lezyonlarında etyoloji. SCIE 2003;14:98-100. [CrossRef]
17. Ciaramitaro P, Mondelli M, Logullo F, Grimaldi S, Battiston B, Sard A, et al; Italian Network for Traumatic Neuropathies. Traumatic peripheral nerve injuries: epidemiological findings, neuropathic pain and quality of life in 158 patients. J Peripher Nerv [CrossRef]
18. Dunn JC, Eckhoff MD, Nicholson TC, Campbell W, Kenney K, Smith J, et al. Combat-Sustained Peripheral Nerve Injuries in the United States Military. J Hand Surg Am 2021;46:148.e1-148.e8. [CrossRef]
19. Temiz Ç, Mehtiyev R, Kaçar Y, Ezgü C, Özer İ, Kural C, et al. Periferik Sinir Lezyonlarında Prognostik Faktörler ve Klinik Sonuçlarımız. Firat Tip Dergisi 2016;21:209-13. [CrossRef]
20. Yegiyants S, Dayicioglu D, Kardashian G, Panthaki ZJ. Traumatic peripheral nerve injury: a wartime review. J Craniofac Surg 2010;21:998-1001. [CrossRef]
21. Secer HI, Daneyemez M, Tehli O, Gonul E, Izci Y. The clinical, electrophysiologic, and surgical characteristics of peripheral nerve injuries caused by gunshot wounds in adults: a 40-year experience. Surg Neurol 2008;69:143-52; discussion 152. [CrossRef]
22. Uzun N, Tanriverdi T, Savrun FK, Kiziltan ME, Sahin R, Hanimoglu H, et al. Traumatic peripheral nerve injuries: demographic and electrophysiologic findings of 802 patients from a developing country. J Clin Neuromuscul Dis 2006;7:97-103. [CrossRef]
23. Robinson LR. How electrodiagnosis predicts clinical outcome of focal peripheral nerve lesions. Muscle Nerve 2015;52:321-33. [CrossRef]
24. Weddell G, Glees P. The early stages in the degeneration of cutaneous nerve fibres. J Anat 1941;76:65—93. [CrossRef]
25. Pannell WC, Heckmann N, Alluri RK, Sivasundaram L, Stevanovic M, Ghiassi A. Predictors of Nerve Injury After Gunshot Wounds to the Upper Extremity. Hand (NY) 2017;12:501-6. [CrossRef]
26. Ultee J, Hundepool CA, Nijhuis TH, van Baar AL, Hovius SE. Early posttraumatic psychological stress following peripheral nerve injury: a prospective study. J Plast Reconstr Aesthet Surg 2013;66:1316-21. [CrossRef]
27. Kaya B, Özsoy S, Balandız H, Genç H, Balaban AN. Evaluation of Traumatic Hearing Loss in Terms of Forensic Medicine: Retrospective Descriptive Research. Turkiye Klinikleri J Foren Sci Leg Med 2024;21:10-20. [CrossRef]

ORİJİNAL ÇALIŞMA - *ÖZ*

Travmatik periferik sinir yaralanmalarının Adli Tıp açısından değerlendirilmesi

AMAÇ: Travmatik periferik sinir yaralanmaları, genç yaşlarda engelliliğe yol açan başlıca nedenlerden biridir. Bu çalışmada, travmatik nedenlerle periferik sinir yaralanması gelişen olguların adli tıbbi açıdan değerlendirilmesi ve karakteristik özelliklerinin ortaya konması amaçlanmıştır.
GEREÇ VE YÖNTEM: Gülhane Eğitim ve Araştırma Hastanesi Adli Tıp polikliniğine 01.09.2016-31.06.2023 tarihleri arasında başvuran 6953 olgu retrospektif olarak incelenmiş ve travmatik periferik sinir yaralanması olan 393 olgu çalışmaya dahil edilmiştir. Olguların yaşı, cinsiyeti, mesleği, travma nedeni, dava kapsamı, yaralanan periferik sinirler, eşlik eden kemik kırığı, kas gücü ve duyusal kayıp, fonksiyonel iyileşme durumu, psikiyatrik tanı ve elektromiyografi (EMG) sonuçları incelenmiştir. Tüm olguların tıbbi raporları ilgili yasal mevzuatlar kapsamında değerlendirilmiştir.
BULGULAR: Çalışmada yaşları 17-70 arasında değişen 393 vaka (ort. 28.2 yaş) incelenmiştir. Olguların %94.9'u güvenlik personelidir. En sık yaralanma nedenleri patlayıcı madde ve ateşli silah yaralanmalarıdır. Peroneal, ulnar ve tibial sinirler en sık hasar gören sinirlerdir. EMG bulgularına göre, yaralanan sinirlerin %82.79'unda parsiyel, %17.21'inde total aksonal dejenerasyon saptanmıştır. Yaralanmalar en sık dirsek-ön kol bölgesinde meydana gelmiştir. Olguların %5.1'inde fonksiyonel tam iyileşme gözlenmiştir. %73.3'ünde kemik kırıkları, özellikle diz-bacak bölgesinde saptanmıştır. %22.1'inde psikiyatrik bozukluk gelişmiştir. Yaralanmaların %94.5'i araz niteliğindedir ve %60.7'sinde yaralanmanın üzerinden 18 ay geçtikten sonra muayene gerekmektedir. %94.9'unda engel oranı oluşturacak sekel tespit edilmiştir.
SONUÇ: Travmatik periferik sinir yaralanmalarının adli tıp açısından detaylı değerlendirilmesi yapılmış, bu yaralanmalarla askeri çatışma bölgelerinde sıkça karşılaşıldığı gösterilmiştir. Yaralanmalar sonucunda oluşan semptomlarının dikkatli incelenmesi gereklidir. EMG bulguları, sinir yaralanmalarının değerlendirilmesinde etkili olup, fizik muayene ile birlikte değerlendirilmelidir.

Anahtar sözcükler: Adli tıp; travma; sinir sistemi.

Ulus Travma Acil Cerrahi Derg 2025;31(3):269-275 DOI: 10.14744/tjtes.2024.73076