Journal of Forensic and Legal Medicine 52 (2017) 89–92

Contents lists available at ScienceDirect

Journal of Forensic and Legal Medicine

journal homepage: www.elsevier.com/locate/jflm

Traumatic lower extremity and lumbosacral peripheral nerve injuries in adults: Electrodiagnostic studies and patients symptoms

Arash Babaei-Ghazani [a], Bina Eftekharsadat [b,*], Bahram Samadirad [c], Vida Mamaghany [c], Saeed Abdollahian [d]

[a] Neuromusculoskeletal Research Center, Department of Physical Medicine and Rehabilitation, Iran University of Medical Sciences, Tehran, Iran
[b] Physical Medicine and Rehabilitation Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
[c] Legal Medicine Research Center, Legal Medicine Organization, Tehran, Iran
[d] Ph.D student in Educational Psychology, Islamic Azad University of Tabriz, Tabriz, Iran

ARTICLE INFO

Article history:
Received 25 November 2016
Received in revised form
1 June 2017
Accepted 23 August 2017
Available online 24 August 2017

Keywords:
Nerve injury
Trauma
Electrodiagnostic study
Lower extremity

ABSTRACT

Background: Peripheral nerve injuries (PNI) are relatively common pathologies in clinical practice. PNIs are rare in the lower extremity but have worse prognosis than those in the upper extremity. Electrodiagnostic studies could help better understanding PNIs. In this study, we aimed to evaluate the distribution of lower extremity PNI in traumatic patients in northwest of Iran.
Methods: In this prospective study, 74 patients (62 male and 12 female with mean age of 38.39 ± 14.42 years) with possible lower or lumbosacral peripheral nerve injury were studied. Patients' demographic information and physical examination findings were recorded. Electrodiagnostic investigations including electromyography and Nerve Conduction Study were performed for all subjects.
Results: Common chief complaints were pain and weakness. Impairment in the sensory function was present in 59.5% and muscle force reduction in 47.3%. PNIs were present in 23.0% and mostly were severe. Injuries in sciatic nerve were the most common PNIs (16.2%). Electrodiagnostic studies showed radiculopathy in 48.7% and plexopathy in 8.10% of cases. In 52 patients (70.3%), the physical examination findings were compatible with Electrodiagnostic studies.
Conclusion: Not all patients presenting with traumatic injuries have lower extremity PNIs. Due to the nature of the trauma and the anatomical course of the nerves, sciatic nerve is more susceptible to traumatic injuries.

1. Introduction

Peripheral nerve injuries (PNI) are relatively common pathologies in clinical practice and occur in approximately 3% of all trauma patients which increase morbidity and affect functional outcomes.[1–3] But, PNIs in the lower extremity are relatively rare and accounts for about 20% of overall lesions to the peripheral nerve system and have worse prognosis than those in the upper extremity.[4]

These traumatic PNI are worldwide problem and a significant cause of physical disability that affects mainly young adults of working age.[2,5] PNI pose various challenges to patients, ranging from mild discomfort to life-long impairment and may be accompanied by neurological deficits. These injuries may lead to irreversible disabilities in patients, such as sensory loss, deficient motor function, pain problems in terms of cold intolerance and hyperesthesia, that ultimately impair extremity function, and affect quality of life at work and in society.[6–8]

Certain peripheral nerves are at an increased risk of injury because of their anatomic location.[9,10] Mild injuries may cure without intervention but severe injuries may lead to lifelong disabilities if they are not diagnosed and treated appropriately.[2,11,12]

Typically, the diagnosis has been based mainly on the combination of clinical history, physical examination, and electrodiagnostic studies. Special tests can be used to support or confirm a nerve injury including electromyography (EMG), nerve conduction studies (NCS).[13–16] EMG is the most important diagnostic method for evaluating PNIs. These studies help in precise localization of the lesion and also in assessing the severity of the lesion, thus facilitating the treatment options.[5] Although PNI in lower extremities

* Corresponding author.
E-mail address: binasadat@yahoo.com (B. Eftekharsadat).

http://dx.doi.org/10.1016/j.jflm.2017.08.010
1752-928X/

Abbreviations

PNI	Peripheral nerve injuries
EMG	Electromyography
NCS	Nerve conduction studies
SNAP	Sensory Nerve Action Potential
CMAP	Compound Muscle Action Potential

are rare, but if not diagnosed and treated early, may cause serious disabilities later.

1.1. Aim of the work

In this study, we aimed to evaluate the distribution of lower extremity PNI in traumatic patients in northwest of Iran.

2. Materials and methods

Between March 2012 and March 2013, all patients with lower and lumbosacral trauma visiting Forensics Organization were evaluated. All traumatic patients were examined and those with any clinical doubt of lower or lumbosacral peripheral nerve injury were included. Injuries caused by infectious diseases, autoimmune diseases, inherited diseases or other non-traumatic events were excluded. Patients with iatrogenic etiology of injury were also excluded. This study was approved by ethics committee of Tabriz University of Medical Sciences, and the informed consent was obtained from all study participants.

All patients were evaluated 3–5 weeks after the incident. Patients' demographic information, their past trauma history, and recent trauma characteristics and physical examination findings were recorded in a pre-defined checklist. All patients were referred to physical medicine and rehabilitation clinic for diagnostic investigations. Physical medicine and rehabilitation specialist performed complete sensory and motor examination and electrodiagnostic investigations (EMG and NCS). Sciatic, Tibial and Proneal nerves were examined using both Sensory Nerve Action Potential (SNAP) and Compound Muscle Action Potential (CMAP). Peroneal and tibial nerve motor amplitudes were measured as peak to peak for CMAP at the ankle and the knee, and for baseline to negative peak for the sural SNAP amplitude. The latency was measured at the onset from the initial deflection from baseline and at negative peak, for CMAPs and SNAPs respectively. Complete Needle EMG of all muscles innervated from different nerve roots and peripheral limb nerves performed.

All statistical tests were performed using SPSS for windows Version 17 (Chicago, IL, USA). Quantitative data were presented as mean ± standard deviation (SD), while qualitative data were demonstrated as frequency and percent (%).

3. Results

Seventy-four traumatic patients with lower extremities or lumbosacral neuropathy including 62 male (83.8%) and 12 female (16.2%) with mean age of 38.39 ± 14.42 were included. Only in 3 patients (4.3%) there was a previous history of peripheral nerve injury.

Trauma was caused mainly by vehicle accidents (Fig. 1). The injuries were made by two types of factors including hard objects in 63 patients (85.1%), sharp objects in 6 patients (8.1%) and both hard and sharp objects in remaining 5 patients (6.8%). Patient's main chief complaints were pain in 35 patients (47.3%), weakness in 15 patients (20.3%), parasthesia in 10 patients (13.5%), and pain, weakness or parasthesia together in 14 (18.9%).

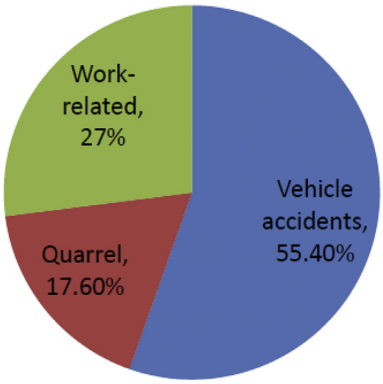

Fig. 1. Trauma causes.

Of 74 traumatic patients, 28 patients (37.8%) had lower extremities trauma, 44 patients (59.5%) had lumbosacral trauma and 2 patients (2.7%) had both lower extremities and lumbosacral trauma (Table 1). Among enrolled patients, 15 patients (20.3%) had open wound injury, 6 patients (8.1%) had tendon injury, 22 patients (29.7%) had fracture or dislocation in traumatic extremity and 20 patients (27.1%) had limitation in range of motion in the traumatic joint. Table 2 demonstrates findings of physical examination of the injured extremity which showed some degree of impairment in the sensory function in 44 patients (59.5%) and some degree of muscle force reduction in 35 patients (47.3%).

PNI were present in 17 patients (23.0%) including mild in 3 cases, moderate in 1 case and severe in 13 cases. Injuries in sciatic nerve were the most common PNIs (Table 3). Electrodiagnostic examination revealed radiculopathy in 36 patients (48.7%) including mild in 21, moderate in 12 and severe in 3 patients. EMG findings showed plexopathy in 6 patients (8.10%): severe plexopathy in 5 patients and mild plexopathy in one patient. In 52 patients (70.3%), the physical examination findings were compatible with Electrodiagnostic results.

Unfortunately, we did not follow these patients to monitor motor or sensory functions recovery.

4. Discussion

In this prospective study, we observed traumatic PNI in lower extremity in 23% of cases. Patients were mostly male and in the

Table 1
Detailed location of trauma site.

Site of Trauma	Number of patients (Percent)
Lumbosacral	44 (59.5%)
Pelvis girdle	7 (9.5%)
Thigh	8 (10.8%)
Leg	3 (4.1%)
Foot	2 (2.7%)
Lumbosacral + Thigh	1 (1.4%)
Lumbosacral + Foot	1 (1.4%)
Lumbosacral + Thigh + Foot	1 (1.4%)
Pelvis + Thigh	2 (2.7%)
Pelvis + Leg	1 (1.4%)
Pelvis + Foot	1 (1.4%)
Pelvis + Thigh + Leg	2 (2.7%)
Thigh + Leg	1 (1.4%)
Total	74 (100%)