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Original Article

Radial nerve neuropathies: a retrospective analysis

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Abstract

Aim: Radial nerve neuropathy is a less common neuropathy among other upper extremity entrapment neuropathies. The aim of this study was to evaluate patients referred to our electrophysiology laboratory with a diagnosis of radial nerve neuropathy.

Material and Methods: Electrophysiological finding of the 42 patients who were referred to the electrophysiology laboratory with the preliminary diagnosis of radial nerve lesion between 2017-2018 were retrospectively scanned.

Results : Forty-two patients were included in the study. 36 patients were male (85.7%), 6 were female (14.3%) and the mean age was 36.09 ± 14.26. Evaluating the relationship between the etiology of the nerve injury showed that the highest rate was consisted of radial nerve sensory and motor axonal lesions which occurred after traffic accidents. The majority of the patients had dropped hand and finger (85.7%).

Conclusion : In the etiology of radial nerve lesions, the causes such as trauma and work accidents are at the forefront and this may explain the increased incidence in men. Electromyography can provide valuable contributions to diagnosis, treatment planning and prognosis.

Keywords: Radial Nerve; Neuropathy; Etiology; Electromyography.

INTRODUCTION

Radial nerve C5-T1 root originates from the posterior brachial plexus cord and passes through the spiral sulcus at the posterior surface of the humerus. After innervating the brachioradialis, extensor carpi radialis longus and brevis muscles, it divides into two branches as superficial and deep at the level of the forearm. The superficial branch passes under the brachioradial muscle and descends on the back of the hand (1-3).

The deep motor branch, the posterior interosseous nerve (PIN), travels deep and passes behind the fibrous Froshe arc on the supinator muscle surface. As well as the supinator muscle and the extensor muscles of the fore arm and hand PIN also innervates extensor carpi radialis longus and brachioradialis muscles (2,4)

Radial nerve neuropathies may occur due to proximal branch damage or PIN damage in the forearm as a result of trauma-induced humeral fracture or superficial branch lesions (1, 5). Blunt trauma of the forearm can result from different causes, such as firearm injuries, sharp object injuries, falling, and clock belt tightening (2). The purpose of this study was to evaluate the cases that had an initial diagnosis of radial nerve neuropathy in our electroneuromyography (ENMG) laboratory in terms of age, gender, application complaints, etiological causes and ENMG findings.

MATERIAL and METHODS

In the study, files of 42 patients who were referred to the ENMG laboratory with the preliminary diagnosis of radial nerve lesion between 2017 and 2018 were retrospectively scanned. Data on age, gender, neurological examination findings, etiological causes (traffic accidents, industrial injury, gunshot or injuries, trauma, etc.) and ENMG results were recorded.

Statistical analysis

Data were processed using the Statistical Package for Social Sciences software (SPSS, Chicago, II) version 17.0 and statistical significantlevel was set as $p<0.05$.

RESULTS

Forty-two patients were included in the study. 36 patients were males (85.7%), 6 were females (14.3%) and the mean age was 36.09 ± 14.26. Patients evaluation according to etiological reasons were as follows; 31.0% were traffic

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accidents, 26.2% were cutting tool injuries, 23.8% were industrial injury, 14.3% were idiopathic and 4.8% were firearm injuries (Figure 1). Etiological reason of three female patients was traffic accident and the others were idiopathic.

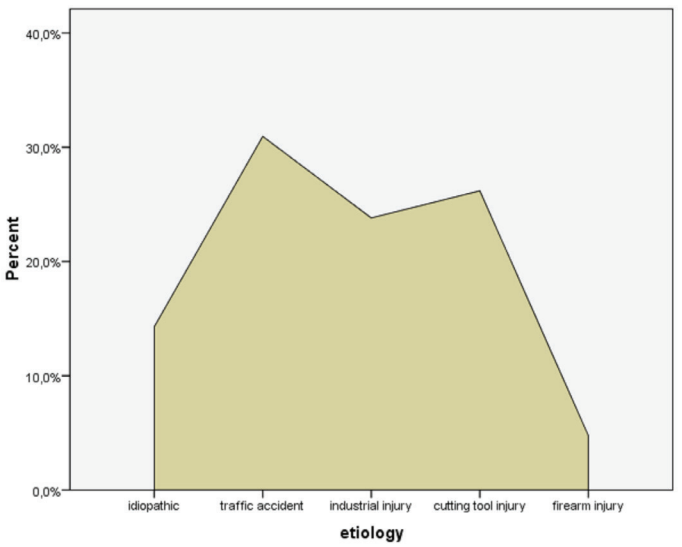

Figure 1. Etiological distribution of radial nerve neuropathy

When the patients' ENMG results were evaluated, the highest rate was 42.9%, which was consisted of radial nerve sensory and motor axonal lesions. The ENMG diagnoses are given in Table 1. Other nerve lesions (ulnar and median nerve) were present in 23.4% of the patients.

The patients did not have major diseases in their histories. In terms of neurological examination findings, the majority of the patients had dropped hand and finger (85.7%). The average time from the onset of complaints to the time of ENMG examination was 54.71 ± 24.78 days.

Table 1. ENMG diagnostic distribution of patients

	Count	Percent
Radial nerve sensory and motor axonal neuropathy	18	42.9
Posterior interosseous nerve axonal neuropathy	9	21.4
Spiral groove-triceps muscle distal neuropathy	5	11.9
Brachial plexopathy	9	21.4
Servical radiculopathy	1	2.4

ENMG, Electroneuromyography

DISCUSSION

In this study, the patients who applied to our clinic with radial nerve lesion as preliminary diagnosis and had ENMG, we concluded that motor axonal damage of the radial nerve had the greatest extent. Radial nerve lesion may develop in many levels and due to different causes. Radial nerve may be damaged in the proximal segment, in the spiral groove or back of Frohse due to repetitive pronation and supination movements of the forearm (5). The incidence of radial nerve neuropathies according to gender (F: M) ranges from 1: 1 to 1: 6 and patients are generally between the ages of 30 and 50 years. Bilateral involvement is rare and usually the dominant side is involved (6). In our study, 85.7% of the patients were male patients and the mean age was 36,09±14,26.

Among the causes of radial nerve neuropathy, orthopedic traumas play the first role. In Garcia and Maeck's study, a radial nerve lesion was found in 12% of 227 humerus fractures (7). In a study conducted, radial nerve damage was detected in 12% of patients with 237.000 humeral shaft fractures, and 70% of them recovered spontaneously within 8-16 weeks (8). Demiryürek et al found that the cause of radial nerve damage was humerus and radius fracture mostly (39%) (9). We also observed that the highest seen etiologic cause of radial nerve damage in our study was fractures due to traffic accidents (31%).

In the clinical presentations, findings may differ according to the level of damage of the radial nerve. Radial nerve damage or compression above the elbow level leads to wrist drop, brachioradialis paraplegia, extensor digitorum paraplegia and sensory loss in the radial side of the dorsal surface of the hand. The sensation of the anatomical snuffbox (also known as the radial fossa; on the dorsal of the hand between the thumb, index finger and dorm of the third finger), is reduced. If there is weakness in the triceps as well as decrease in reflexes, the lesion may be located in the root or plexus. If the brachioradial and extensor carpi radialis longus muscles are affected, the lesion is probably in the humerus shaft. Damage that may appear as partial or complete paralysis in the depleted humerus shaft fractures may develop at the same tie with the fracture or following reduction. Proximal radial nerve lesions develop dropped hand/finger or both usually results in limitation of thumb abduction and extension (8,10,11). The important point during the examination is that the physician should hold the wrist in the passive extension position while evaluating the finger extension. Otherwise, since the wrist remains in the flexion position, mechanical extension that occurs on the finger may be misleading. In our study 85.7% of the cases had dropped hands and fingers.

The region where the PIN is most frequently trapped is the point where it passes through the fibers of forearm supinator muscles more distally. In the clinic presentation, patients cannot lift their fingers at the metacarpophalangeal joint level and classically radial deviation is seen during wrist extension due to the fact that the muscle of the extensor carpi radialis longus is not affected (12). In some publications, the situation is defined as " nerve entrapment with resistant lateral epicondylitis" (13,14). In the ENMG examination, extensor digitorum communis and extensor indicis proprius muscles were affected. Sensory conduction study was normal (1). In our study, 9 patients had a PIN lesion.

Imaging methods do not contribute in diagnosis. Magnetic resonance (MR) imaging and other imaging modalities may not reveal pathological findings. However, although

some studies suggest that muscle edema and atrophy are seen in MR, this issue is still controversial (15). The most valuable method for diagnosis is ENMG. Although there is a possibility of not finding any significant findings within the first 3 weeks, the ENMG examination identifies the severity of the trauma and provides valuable contributions to early surgical planning. Generally, it is stated that ENMG can be performed before the operation on patients whose complaints have continued for 6-8 weeks. However, early and late follow-up ENMG studies are important in practice (1). In our study, the average time passed until the ENMG examination was 54 to71 days. This suggests that when etiologic causes are taken into account, ENMG is more desirable for the follow up of the patients whose remission is limited and taking time.

Conservative and surgical methods can be used in the treatment. Commonly used conservative methods are immobilization with wrist splint, physical therapy methods and non-steroidal anti-inflammatory (NSAID) drug use. Another method is to make a complete or partial radial nerve blocking by applying local anesthesia into the radial tunnel. However, the success of conservative treatments is still controversial and surgery is recommended if symptoms do not improve within 3 months (12,16).

Limitations

The most important limitation is the insufficient results obtained on the outcome of patients' follow-up and prognosis.

CONCLUSION

In the etiology of radial nerve lesions, the causes such as trauma and work accidents are at the forefront and this may explain the increased incidence in men. ENMG can provide valuable contributions to diagnosis, treatment planning and prognosis.

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