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COMMON PERONEAL NEUROPATHY IN HARVESTING FARMERS

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ABSTRACT

OBJECTIVES: To evaluate farmers with acute foot drop and determine the level and type of nerve injury.

METHOD: In Pakistan harvesting season occurs from April to May and again from October to December. Thirteen farmers with a history of foot drop were studied in neurophysiology laboratory of Lady Reading Hospital (LRH) during the period from March 2019 to December 2019. All the patients had nerve conduction study (NCS) while in some of the patients, electromyography (EMG) was also done to determine the duration of injury and to rule out other differential diagnoses.

RESULTS: Except two farmers case 2 and case 6 who had significant amplitude drop at all the three sites, remaining had conduction block at the site of nerve entrapment favoring demyelinating type of neuropathy.

CONCLUSION: Prolonged squatting, the position used during harvesting the crops, can cause common peroneal nerve palsy in farmers during harvesting season. Except 2 patients who had decreased amplitude common peroneal motor nerve at all the 3 site when compared to the contralateral limb, all the remaining had conduction block at the entrapment site indicating a demyelinating process.

KEY WORDS: Common Peroneal Neuropathy, Harvester's Palsy, Foot drop.

INTRODUCTION

The common peroneal nerve is a branch of sciatic nerve; it provides sensation to the front and sides of the legs and to the top of the feet and also supplies the muscles that cause dorsi-flexion of foot and toes. It winds around the neck of the fibula and terminates by dividing into the superficial and deep fibular (peroneal) nerves.¹ The common peroneal nerve is most vulnerable to injury as it passes around the fibular neck². Common peroneal neuropathy is the commonest mono-neuropathy that occurs in the lower limbs and is the third most common mononeuropathy overall following median (carpal tunnel syndrome) and ulnar neuropathies.^{3,4,5} The commonest presentation of a common peroneal nerve injury is a weakness of ankle dorsi-flexion that results in foot drop⁶. Literature review has mentioned numerous causes for peroneal nerve neuropathies which include prolonged squatting/leg-crossing, low-grade infection, dilated veins, drastic weight loss, schwannoma, neurofibroma, pneumatic compression, total knee arthroplasty,

proximal tibial osteotomy and ganglion cysts⁷. In short, most of the lesions of peroneal nerve are traumatic in origin either due to traction, laceration or compression^{8,9}. In case of farmers, deep peroneal branch of common peroneal nerve is usually affected rather than the whole nerve¹⁰. Squatting is thought to cause common peroneal neuropathy by compressing it between the biceps femoris and lateral head of gastrocnemius at the top and between the fibrous arch formed by the peroneus longus and fibular head at the bottom.^{11,12} Prolonged squatting can cause common peroneal neuropathy by different mechanisms including crushing of the fibres that leads to Wallerian degeneration (requiring surgical management)^{13,14} and ischaemia resulting in metabolic injury¹⁵. Diagnosis of common peroneal nerve palsy is based on clinical examination and electrophysiological study. The differential diagnosis includes sciatic mono-neuropathy, lumbosacral plexopathy, motor neuron disease, poly-neuropathy and L5-radiculopathy. They can be

ruled out by complete history, clinical examination and neuro-physiological studies. The NCS findings in case of common peroneal neuropathy at the fibular head can vary from prolongation of distal latency to conduction block at the head of fibula.

OBJECTIVES

To evaluate farmers with acute foot drop and to determine the level of nerve injury and identify type of injury in harvesting farmers working in the neighboring districts of Peshawar, Khyber Pukhtoonkhwa, Pakistan.

METHOD OF STUDY

After taking informed consent, thirteen (13) farmers were studied in the neurophysiology lab of Lady Reading Hospital after detailed history, examination and other relevant investigations. The investigations included CBC with MCV, inflammatory markers, urine analysis and random blood glucose. Diagnosis of common peroneal nerve palsy was made on the basis of clinical assessment and nerve conduction studies along with electromyography (EMG) in selected patients. Patients with past history of mono-neuropathy, uncontrolled diabetes, chronic back pain, previous history of foot drop, history of autoimmune disorders and nutritional deficiency including vitamin B12 deficiency were excluded. Patients with acute onset of foot drop (within 4-week) while harvesting with a site of nerve injury around the neck of fibula were included. The site and extent of injury was determined by NCS. The distal latency, amplitude and conduction velocity were used to diagnose and localize the lesion. The values of all the variables were also compared with the contra-lateral normal limb, as shown in Table-1. After telling the patients about the procedure, informed consent was taken from each candidate and NCS was performed by stimulating three points, first at the ankle between the tendons of tibialis anterior and extensor hallucis longus muscles, second below the neck of fibula and the third laterally in the popliteal fossa. After the diagnosis of common peroneal neuropathy, other information about the patients was collected which included patient's height, weight, age, handedness, sex, number of days of work, number of hours of work, value amplitude, conduction velocities and percentage drop across the entrapment site of common peroneal nerve is calculated bilaterally.

RESULTS OF STUDY

A total of thirteen farmers presented with a history of foot drop during harvesting season. Detailed history including past medical history of back pain,

mono-neuropathy, endocrine or other autoimmune disorder was taken. A detailed drug history was also taken. After that, clinical examination and some relevant investigations were done on outpatient basis. Among the patients, only those who fulfilled inclusion and exclusion criteria were taken to neurophysiology lab for nerve conduction studies. Normal values for the three parameters were set according as per our neurophysiology laboratory values. Patients' limbs were warmed, and the study was performed at the room temperature. Three points as mentioned above were stimulated to calculate distal latency, amplitude and conduction velocity. Beside two patients (case-2 and case-6 in table-1) who had dropped in amplitude at all three sites as compare to the contralateral limb, remaining had conduction block at the entrapment site. A diagnosis of common peroneal neuropathy at or around the fibular neck was confirmed after the study.

DISCUSSION

Common peroneal nerve is superficial and is prone to injury at or around the fibula¹⁶. Common peroneal nerve is prone to injury due to compression at fibular head due to specific positions such as crossing of the legs, sitting, and lying down¹⁷. Squatting-induced common peroneal neuropathy has been reported in harvesting farmers¹⁸. The most likely mechanism behind the nerve palsy in harvesters is compression at the fibular head¹⁹. Besides squatting position, the use of dominant hand for harvesting can cause repeated pressure on the nerve at the fibular head which might also be a contributing factor for common peroneal nerve palsy in farmers. Common peroneal neuropathy in farmers has been reported by different studies e.g. Sipahioğlu et al²⁰. Bilateral common peroneal neuropathy in sewer worker has also been reported; the mechanism of injury is almost the same as in farmers²¹. A total of thirteen (13) farmers were studied, the mean age was 25.30 years. Except two of the patients, all the remaining farmers were male and except one female, all the remaining patients were right-handed. The mean number of working hours was 6.53 (S.D=1.127) and mean number of days of work was 11.84. The side of foot drop was related to handedness, 12 patients had the lesion on right side and one left-handed female had it on left side. Mean conduction velocity between below the fibula and lateral popliteal fossa on the affected side was noted to be 36.53 m/s (Standard deviation = 2.10) and it was 48.84 m/s (S.D= 2.15) on the normal side. An average percentage drop of 44.75 was noted with a standard deviation of 17.16. The average conduction velocity below the fibula was more than 44 m/s bilaterally and the average conduction velocity on the normal side between the distal two sites was

51.11m/s, however, this value was 36.53m/s with a S.D of 2.10.

In our study, conduction block across the entrapment site was the major finding in patients with common peroneal neuropathy due to prolong harvesting. As in our study most of the patients were presented in acute phase (within a month of the injury) thus a follow-up study after 6-8 weeks was advised to detect full Wallerian degeneration and to comment on the prognosis of nerve injury.

CONCLUSION

Common peroneal nerve palsy is the most common neuropathy in the lower limb²². Limiting number of hours of work by farmers, taking regular break and reducing number of days of work might be helpful in reducing the chance of common peroneal nerve palsy in farmers. Further study can be done by enrolling a larger number of patients to assess the effect of weight, height and other parameters in developing common peroneal palsy in harvesters.

TABLE-1

CASES	1	2	3	4	5	6	7	8	9	10	11	12	13	MEAN	SD
AGE (Years)	35	19	21	18	17	22	39	41	19	25	24	23	26	25.30769	7.993587
SEX	M	M	M	M	M	M	F	F	M	M	M	M	M		
HANDEDNESS	R	R	R	R	R	R	R	L	R	R	R	R	R		
HEIGHT (cms)	170.18	167.64	160.02	154.94	172.72	157.48	154.94	162.56	182.88	175.26	162.56	170.18	167.6	166.0738	8.329811
WEIGHT (kg)	55	50	61	53	65	61	57	60	70	71	65	59	58	60.38462	6.185177
No. of days of Harvesting	15	11	10	9	11	15	13	14	16	10	9	11	10	11.84615	2.44425
Average continuous work per day without a break of more than half hour	5	6	7	7	8	8	5	6	7	5	6	7	8	6.538462	1.126601
Side of foot Drop (L/R/BL)	R	R	R	R	R	R	R	L	R	R	R	R	R		
Number in parenthesis shows value on contralateral side	36	38	34	37	36	34	35	36	41	40	35	37	36	36.53846	2.106157
Amplitude of motor nerve conduction (mV) at the lateral popliteal fossa (N>=2mV)	2	1.9	1.8	2.1	0.9	1.1	2.3	2.7	3	2.8	2.2	2.3	2.3	48.84615	0.603405
Number in parenthesis shows value on contralateral side	4.7	4.1	4	3.9	4.6	4.4	4.5	5	6.1	5.9	4.6	4.5	4.8	4.7	0.657012
Amplitude of motor nerve conduction (mV) below the fibula head	4.8	2.1	3.8	4	1.2	4.8	5.2	4.4	5.1	4.2	5.8	4	3.8	4.092308	1.251307
Number in parenthesis shows value on contralateral side	5.1	4.7	4.2	4	4.4	5.2	4.8	6	6.2	5.9	4.8	4.8	5	5.007692	0.677571
Amplitude of motor nerve conduction (mV) at the ankle	5.2	2.4	4.2	4.2	1.3	5	6	6.2	5.8	4.4	6	4.2	4.4	4.561538	1.435002
Number in parenthesis shows value on contralateral side	5.6	5.2	5	4.8	4.2	5.3	4.8	6.1	6.5	7	6.8	5.2	5.6	5.546154	0.838267
Drop of amplitude across the fibula	2.8	0.2	2	1.9	0.3	3.7	2.9	1.7	2.1	1.4	3.6	1.7	1.5	1.984615	1.073814
Percentage drop across fibula head on the effected side	58	9.5	52.63	47.5	25	77	55	38.63	41.176	33.33	62.06	42.5	39.47	44.75354	17.16632
Motor Nerve Conduction Velocity (m/s) on affected side between ankle and fibula neck	50	40	56	54	42	48	44	53	48	54	44	46	42	47.76923	5.293925
Motor Nerve Conduction Velocity (m/s) on normal side between ankle and fibula neck	52	48	56	52	46	60	58	55	48	46	52	54	50	52.07692	4.443376

Case 2 and case 6 has dropped in the amplitude of motor nerve conduction at all the 3 sites as compared to the contralateral limb, this favors axonal neuropathy. While remaining cases has conduction block of greater than 20 percent at the entrapment sites which is suggestive of demyelinating neuropathy.

NORMAL VALUES: CV= >44m/s, Amplitude = >2mV Temperature = room temperature

LIMITATION OF STUDY

The number of patients recruited in the study was limited. Further study needs to be conducted with a greater number of patients to determine the effects of different variables on the development of common peroneal neuropathy. In our neurophysiology laboratory we usually do only sural sensory in the lower limb, therefore, superficial peroneal sensory was not performed.

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Harwindar kumar; data collection, data analysis, manuscript writing, manuscript review

Syed Muhammad answer Shah; data collection, data analysis, manuscript writing, manuscript review

Jamita Kor; data analysis, manuscript review

Sadaf qazi; data analysis, manuscript review

Jaswindar kumar; data analysis, manuscript review