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Bilateral foot drop resulting from L1 vertebral compression fracture

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Introduction

Osteoporotic vertebral compression fractures (OVCF) frequently occur after minor trauma or spontaneously in elderly patients, particularly in postmenopausal women. The usual manifestation of OVCF is axial back pain localized to the fracture level. Conservative observation, such as the use of analgesics, spinal orthosis, immobilization, and physical therapy, may be if there are no neurological complications. In cases where symptoms are severe and accompanied by radiculopathy or neurological involvement, surgical treatment such as vertebroplasty, kyphoplasty, or intervertebral fusion may be required. However, spinal cord or nerve root compression complications are rare. We report a case of L1 OVCF causing bilateral L5, S1 nerve root compression with foot drop.

Case

The patient was an 85-year-old woman who presented with bilateral foot drop and back pain after fallen at home 3 weeks ago. On physical examination, dorsiflexion of the bilateral foot and big toe was weak and hypoesthesia along bilateral L5 and S1 dermatomes. Patellar and Achilles tendon reflexes were no hyperreflexia. The radiologic examination showed L1 OVCF and diffuse osteopenia (Figure 1). MRI revealed burst fracture with resultant severe central canal stenosis (Figure 2). The T-score was -3.4 by lumbar bone densitometry.

After being hospitalized at the department of neurosurgery and receiving conservative treatment, she was readmitted a month later for surgical treatment due to worsening symptoms. The surgical procedure involved inserting bilateral pedicle cemented screws in the T12-L2 vertebra and performing a partial laminectomy at L1.

The day after the operation, she showed dysarthria, and the brain MRI showed right superior cerebellum and left parietal-occipital acute infarction (Figure 2). She was transferred to the department of rehabilitation medicine for intensive rehabilitation programs. At that time, she had a strength of trace grade of bilateral ankle dorsiflexion, ataxia, and was impossible of ambulation independently. The nerve conduction studies showed prolonged motor latency and decreased compound muscle action potential on the both peroneal nerves (Table 1). The electromyography demonstrated abnormal spontaneous activity in both tibialis anterior, peroneus longus, gastrocnemius and biceps femoris. These muscles showed a polyphasic motor unit action potential and reduced recruitment pattern. These findings were clinically compatible with bilateral L5, S1 radiculopathy (Table 2).

After the 3 weeks of rehabilitation, the dorsiflexion strength of both feet improved to poor grade, and she could walk with a roll-walker. At the 3-month follow-up, she was able to walk independently without ataxia and showed improved strength of bilateral ankle dorsiflexion to fair grade.

Conclusion

Osteoporotic vertebral body compression fractures rarely cause neurologic deficits. We report a rare case of successful rehabilitation with bilateral foot drop due to L1 OVCF , which was confirmed by electrodiagnostic test.

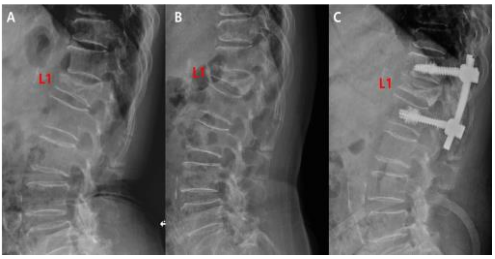

Figure 1. The radiologic examination showed L1 Osteoporotic vertebral compression fractures with osteopenia. (A) at first visit, (B) follow-up in 1 month, (C) a day after the operation.

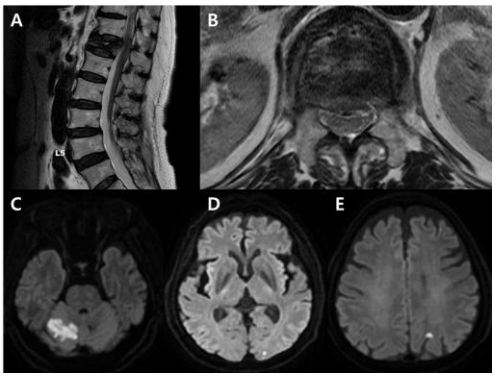

Figure 2. T2-weighted sagittal (A) and axial (B) MRI reveal acute compression fractures in L1 with resultant severe central canal stenosis. High signal intensity was observed in right superior cerebellum (C) and left occipital (D) and parietal (E) in DWI.

Table 1. Nerve conduction study (NCS) results

Motor NCS			
Nerve / Sites	Lat (ms)	Amp (mV)	Vel (m/s)
R Peroneal - EDB			
Ankle	4.64	0.3	
Fibular head	12.60	0.2	42.0
L Peroneal – EDB			
Ankle	4.79	0.2	
Fibular head	11.35	0.1	48.8
R Tibial - AH			
Ankle	3.96	4.1	
Popliteal fossa	10.94	3.1	43.7
L Tibial - AH			
Ankle	3.80	5.8	
Popliteal fossa	11.09	4.0	42.5

Sensory NCS					
Nerve / Sites	Onset Lat (ms)	Peak Lat (ms)	Peak Amp (μV)	Vel (m/s)	Peak Vel (m/s)
R Sural - Ankle	2.24	3.13	5.5	62.5	44.8
L Sural - Ankle	2.55	3.07	3.7	54.9	45.6
R Superficial peroneal - Ankle	2.71	3.59	3.3	51.7	39.0
L Superficial peroneal - Ankle	2.81	3.23	2.2	49.8	43.4

R=right, L=left, EDB= extensor digitorum brevis, AH= abductor hallucis Lat= latency, Amp= amplitude, Vel= velocity

Table 2. Needle electromyography results

Needle electromyography									
	Spontaneous					MUAP			Recruitment
Muscle	IA	Fib	PSW	Fasc	CRD	Amp	Dur	Poly	Pattern
R. VM	Normal	None	None	None	None	Normal	Normal	Normal	Full
R. TA	Normal	4+	4+	None	None	Normal	Normal	Poly	Markedly reduced
R. PL	Normal	4+	4+	None	None	Normal	Normal	Poly	Reduced
R. BFS	Normal	3+	3+	None	None	Normal	Normal	Poly	Reduced
R. GCM	Normal	2+	2+	None	None	Normal	Normal	Poly	Reduced
R. Gmax	Normal	3+	3+	None	None	Normal	Normal	Poly	Reduced
L. VM	Normal	None	None	None	None	Normal	Normal	Normal	Full
L. TA	Normal	4+	4+	None	None	Normal	Normal	Poly	Markedly reduced
L. PL	Normal	4+	4+	None	None	Normal	Normal	Poly	Reduced
L. GCM	Normal	1+	1+	None	None	Normal	Normal	Normal & Poly	Slightly reduced
L. BFS	Normal	2+	2+	None	None	Normal	Normal	Normal & Poly	Slightly reduced
L. Gmax	Normal	1+	1+	None	None	Normal	Normal	Normal & Poly	Slightly reduced

Spontaneous= spontaneous activity, MUAP=motor unit action potential, R=right, L=left, VM=vastus medialis, TA=tibialis anterior, PL=peroneus longus, GCM= gastrocnemius medial head, BFS = biceps femoris short head, Gmax= gluteus maximus, IA=insertional activity, Fib=fibrillation potential, PSW=positive sharp wave, Fasc=fasciculation potential, CRD=complex repetitive discharge, Amp=amplitude, Dur=duration, Poly=polyphasic potential