

## Deep peroneal neuropathy probably due to neglected anterior compartment syndrome

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### Introduction

Compartment syndrome is a condition in which increased compartment pressure within a confined space compromises the viability of enveloping tissues. It remains emergencies in traumatology since it has a high risk of associated limb morbidity if left untreated. We examined a patient suffering the right foot drop after painful swelling of the right anterior tibial area. This is, to our best knowledge, the first case revealing the long-term complicated sequelae of neglected anterior compartment syndrome.

### Case report

A 38-year-old male patient visited the clinic and complained of the right foot drop. The patient had no underlying disease but could quite clearly memorize the traumatic injury of his right lower leg about 15 years ago. When playing soccer, he had accidentally kicked a hard stuff with his anterior leg and it soon became swollen with severe pain. The symptom gradually improved after applying long-leg cast, but the right ankle dorsiflexor weakness then commenced and progressed. The manual muscle testing and calf circumference measurement represented remarkable side-to-side discrepancy. The patient then underwent electromyography (EMG). The right peroneal motor response with extensor digitorum brevis (EDB) muscle recording was of decreased velocity at the fibular head stimulation while that at the ankle stimulation was normal. Additional exploration could not locate accessory peroneal nerve innervating EDB. The right deep peroneal sensory response was unobtainable. In needle EMG of the right tibialis anterior (TA) and extensor hallucis longus (EHL) muscles, only 1 or even no motor unit potential was identifiable. On the other hand, parameters of the right EDB were within normal limits. Here we could diagnose incomplete deep peroneal neuropathy with the necrosis of the right TA and EHL, which is enveloped in the anterior tibial compartment.

### Discussion

The “6 Ps” have been widely used to describe clinical manifestation of compartment syndrome. When it comes to “paralysis”, injury of the enveloped nerve causes its innervating muscle weakness but physicians should also focus on the possibility of direct damage on the enveloped muscles. In this case, EMG findings suggested deep peroneal neuropathy around the leg sparing EDB, which is located below the injured area. TA and EHL are both innervated by deep peroneal nerve as EDB is, but they are anatomically placed in a confined area called anterior compartment while EDB lies distal to those muscles. Since there was no evidence of accessory peroneal nerve innervation, we could deduce that excessive swelling of the patient’s anterior tibial area pressed the soft tissue

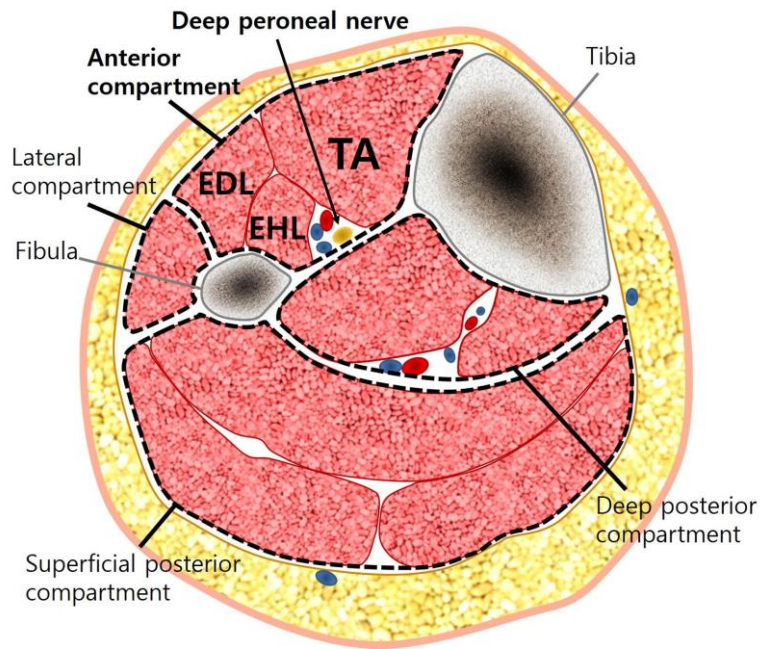
in the anterior compartment, and the relevant muscle necrosis with neuropathy progressed while the patient was untreated. This case implies that physicians must check symptoms of compartment syndrome at the time of not only the first diagnosis but also the serial medical follow-up.

Motor nerve conduction study							
Nerve / Sites	Latency (ms)	Amp.1-2 (mV)	Dur. (ms)	Area (mVms)	Distance (cm)	Lat Diff (ms)	Velocity (m/s)
<b>R TIBIAL (KNEE) – AH</b>							
1. Ankle	5.05	18.9	5.65	54.6		5.05	
2. Knee	13.80	16.1	6.10	52.8	40	8.75	45.7
<b>R COMM PERONEAL – EDB</b>							
1. Ankle	5.65	5.0	5.50	12.8		5.65	
2. Fib Head	14.30	4.8	8.25	14.9	27	8.65	31.2*
3. Knee	15.80	4.5	8.05	14.2	8	1.50	53.3
Sensory nerve conduction study							
Nerve / Sites	Rec. Site	Latency (ms)	Lat. 2 (ms)	Amp.1-2 (µV)	Resp.	Lat Diff (ms)	
<b>R SURAL – Lat Malleolus</b>							
1. Calf	Lat Malleolus	2.85	3.75	21.8		2.85	
<b>R SUP PERONEAL – Foot</b>							
1. Lateral Leg	Foot	2.55	3.45	17.6		2.55	
<b>R DEEP PERONEAL – Foot</b>							
1. Dorsum	First web					No*	
<b>L DEEP PERONEAL – Foot</b>							
1. Dorsum	First web	1.95	2.70	6.3		1.95	

Motor and sensory nerve conduction study Results of the patient's right upper and lower extremities.

Needle electromyography								
	IA	Spontaneous			MUAP			Recruitment
		Fib	PSW	Fasc	Amp	Dur	PPP	Pattern
R. TIB ANTERIOR	Decreased	None	None	None				1 MUAP
R. EXT HALL LONG	Decreased	None	None	None				No Activity
R. EXT DIG BREVIS	N	None	None	None	1+			Reduced
R. PERON LONGUS	N	None	None	None	N	N	N	Sl. reduced
R. VAST LATERALIS	N	None	None	None	N	N	N	Normal
R. T FASCIA LATA	N	None	None	None	N	N	N	Normal
R. TIB POSTERIOR	N	None	None	None	N	N	N	Normal
R. GASTROCN (MED)	N	None	None	None	N	N	N	Normal
R. GLUTEUS MAX	N	None	None	None	N	N	N	Normal
R. L4 PSP	N	None	None	None				
R. L5 PSP	N	None	None	None				
R. S1 PSP	N	None	None	None				

Needle electromyography Results of the patient's right lower extremity and lumbosacral paravertebral muscles.



Axial section of the lower leg. Abbreviations: TA, tibialis anterior; EHL, extensor hallucis longus; EDL, extensor digitorum longus