

A Case of Chronic Non-Exertional Compartment Syndrome

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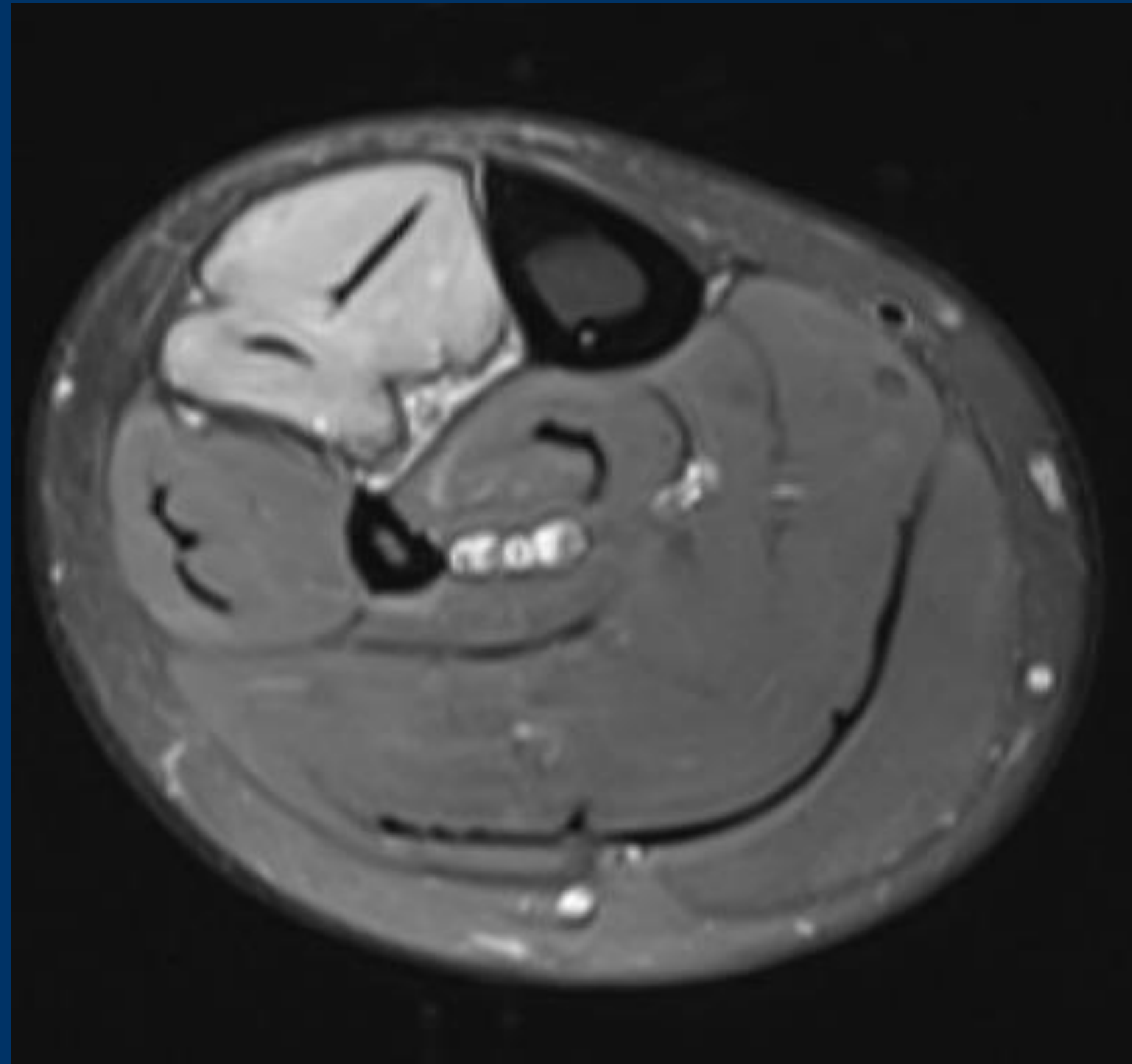
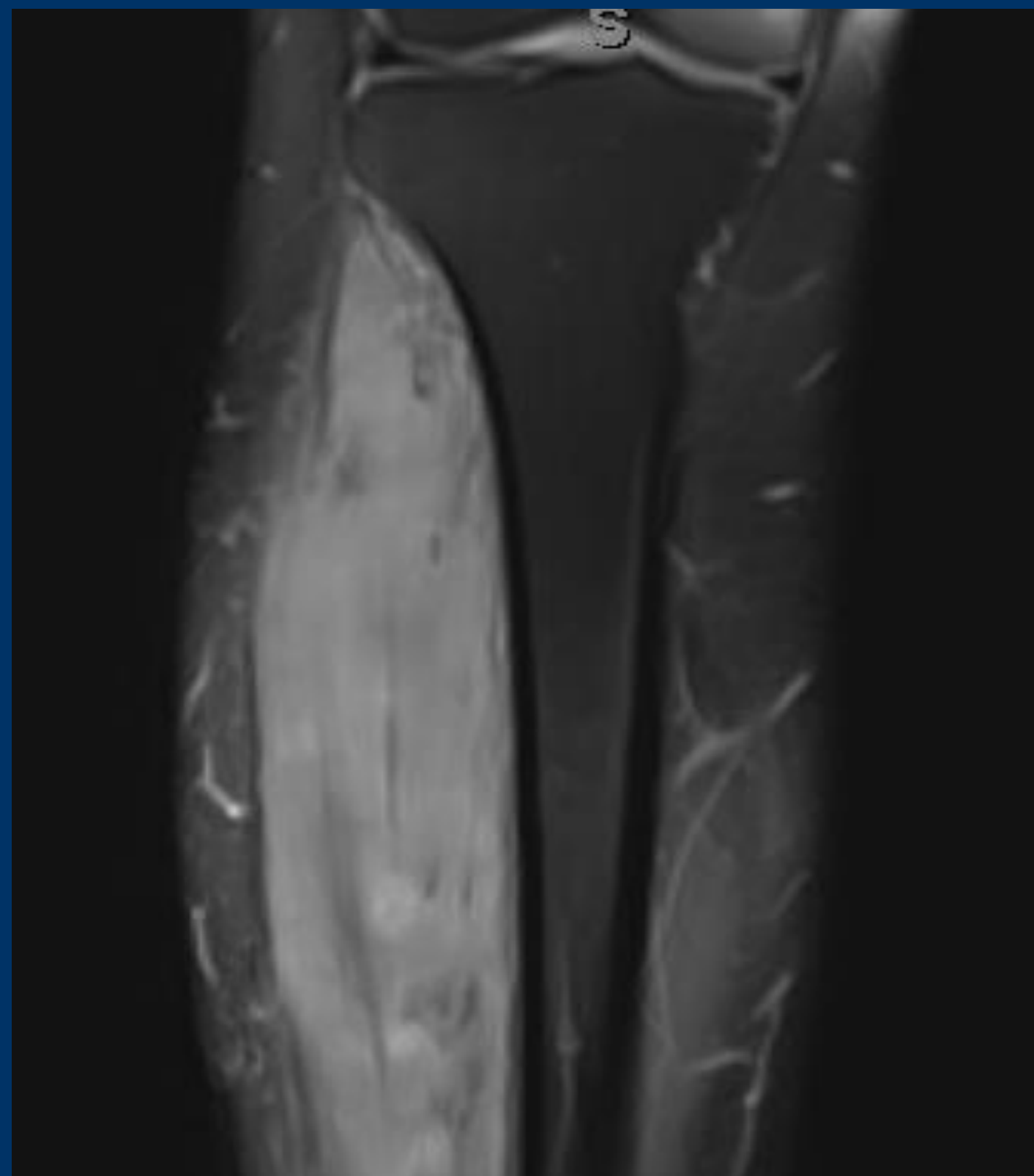
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Case Description

A 27-year-old male patient presented to the emergency department with right ankle pain and weakness in dorsiflexion and inversion following a soccer match. He was diagnosed with a lateral ankle ligament sprain and treated with bracing and physical therapy. Although his pain diminished, after several months his strength had not returned. MRI at four months post-injury showed diffuse edema of the tibialis anterior and extensor digitorum muscles, consistent with possible denervation. EMG showed a severe right deep peroneal neuropathy with sparing of the superficial and proximal common peroneal innervated muscles, consistent with nerve ischemia. Interestingly, EMG also showed increased insertional activity and polyphasic units of the left tibialis anterior, as well. A work-up for metabolic neuropathy, vasculitis, and myositis with CBC, ESR, CRP, ANA, TSH, CK, and aldolase was unremarkable. Invasive compartment pressure testing revealed significantly elevated anterior compartment pressures at rest and after one minute of brisk treadmill walking, which were confirmed with repeat testing at a follow-up visit. Anterior compartment pressures on the contralateral side were elevated as well, although not quite so severely.

Imaging



T2-weighted MRI in the coronal (left) and axial (right) planes, showing diffuse edema of the tibialis anterior and extensor digitorum muscles of the right leg.

EMG

Motor Nerve Conduction									
Nerve and Stimulus Site	Onset Latency	Amplitude	Conduction Velocity	Distance	Normal				
Tibial.R/Abductor Hallucis									
Ankle	4.3 ms	13.8 mV		90 mm	yes				
Pop fossa	10.5 ms	10.7 mV	66.2 m/s	410 mm	yes				
Peroneal.R/Extensor digitorum brevis									
Ankle	absent	absent		90 mm	no				
Fib head	absent	absent		absent	no				
Pop fossa	absent	absent		absent	no				
Peroneal.R/Peroneus longus									
Fib Head	2.4 ms	2.5 mV		100 mm	yes				
Pop fossa	3.9 ms	2 mV	41.1 m/s	60 mm	yes				
Peroneal.R/Tibialis anterior									
Fib Head	absent	absent		absent	no				
Pop fossa	absent	absent		absent	no				
Peroneal.L/Extensor digitorum brevis									
Ankle	4.9 ms	4.1 mV		90 mm	yes				
Fib head	11.7 ms	4.3 mV	40.6 m/s	275 mm	yes				
Pop fossa	13.6 ms	4.5 mV	41.5 m/s	80 mm	yes				
Needle EMG Data									
Muscle	Side	Spontaneous Activity			Motor Unit Morphology			Interference Pattern	
		Insertional Activity	Fibs/Pos. Waves	Fascics	Duration	Amplitude	Phases	Activation	Recruitment
Tensor Fasciae Latae	R	Normal	0	0	Normal	Normal	Normal	Normal	Normal
Biceps Femoris (short)	R	Normal	0	0	Normal	Normal	Normal	Normal	Normal
Vastus Medius	R	Normal	0	0	Normal	Normal	Normal	Normal	Normal
Tibialis Anterior	R	Decrease	0	0					
No motor units									
Peroneus Longus	R	Normal	0	0	Normal	Normal	Normal	Normal	Normal
Medial Gastrocnemius	R	Normal	0	0	Normal	Normal	Normal	Normal	Normal
Extensor Hallucis Longus	R	Decrease	0	0					
No motor units									
Extensor Digitorum Brevis	R	Increase	+3	0					
No motor units									
Tibialis Anterior	L	Increase	0	0	Normal	Normal	+1	Normal	Normal
occasional prolonged duration motor units									

Compartment Pressure Testing

Anterior Lower Leg Compartment	Right	Left
Initial Visit		
Resting	81 mm Hg	Not Tested
Post-exertional	92 mm Hg	Not Tested
Follow-Up Visit		
Resting	92 mm Hg	35 mm Hg
Post-exertional	91 mm Hg	50 mm Hg

Discussion

Chronic exertional compartment syndrome (CECS) occurs when increased intramuscular pressure during exercise impedes tissue perfusion, causing pain, paresthesia, and weakness. Typically, these symptoms are episodic and transient, resolving with cessation of activity. This patient's presentation is not consistent with CECS, as his symptoms were persistent, non-exertional, and severe enough to include muscle weakness. Widely accepted diagnostic criteria for CECS include compartment pressures >30 mmHg at one minute post-exercise or >20 mmHg at five minutes post-exercise. This patient had *resting* anterior compartment pressures that tripled these threshold values. While an acute compartment syndrome with resultant severe deep right peroneal neuropathy is a possible diagnosis, it would not explain elevated resting pressures in the contralateral leg as well. This irregular presentation is more consistent with a chronic non-exertional compartment syndrome, in which compartmental pressures are consistently elevated regardless of activity level.

Conclusion

In rare instances, chronically elevated resting compartment pressures may predispose patients to permanent neurological damage with only moderate physical activity.