



## EMG Case No. 43, February 2000

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### **Presenting Symptom: Back/chest wall pain and numbness, with weight loss**

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**Presenting Symptom:** Back/chest wall pain and numbness, with weight loss

**Appropriate Audience:** Residents as well as practicing physiatrists.

**Learning Objectives:** After completing this educational activity, participants will be able (1) to formulate appropriate differential diagnosis and come up with final diagnosis on the basis of EMG and nerve conduction findings along with additional diagnostic studies including bone scan and MRI scan of the thoracic spine; (2) assess their ability to apply a systematic approach to the differential diagnosis of EMG cases; and (3) compare their diagnostic impressions with those of leading experts in electrodiagnosis.

### **History**

A 50-year-old man with diabetes, on insulin, who has been having numbness, tingling sensation, and pain involving his left mid-back, low chest wall, and left side of the abdomen for approximately 10 weeks. He does not remember any injury or accident to account for these symptoms, which have been worsening somewhat. He has not had other complaints besides weight loss of over 30 pounds in one year and poor diabetic control. He denies respiratory symptoms or change in bowel habits.

- *Prior to continuing, develop a differential diagnosis and list each possible diagnosis in the order of likelihood.*

### **At this point the differential diagnosis may include:**

1. diabetic thoracic radiculopathy.
  2. metastatic cancer to the thoracic spine.
  3. intervertebral disk herniation.
  4. degenerative arthritis involving the thoracic spine.
  5. primary or secondary tumors of the spinal cord or the nerve roots.
  6. impairment of intercostal nerves at multiple levels.
- *Is there any additional information from the clinical history that might be helpful in clarifying your differential list or changing its order of priority?*

### **Commentary I**

The referring internist ordered complete blood count, kidney and liver functions studies, and rheumatologic lab studies. All test results were normal. The blood sugar has been 200-300 mg% despite treatment. He does not smoke cigarettes or consume alcohol and has been fairly active with his work as a sales person; in addition, he exercises 2 to 3 times a week. The pain is constant. He denies fever or chills, or any bowel or bladder problems. Coughing, sneezing or bowel movements do not exacerbate or reproduce his pain.



**Physical Examination**

The physical examination revealed a well-developed, well-nourished man in no acute distress. Mental function is normal. Cranial nerve examination is normal. Muscle stretch reflexes are 2+ in the upper limbs and trace in the lower limbs. Sensory examination revealed no focal abnormal findings of the upper limbs, with mildly decreased vibratory sensation at both toes compared to the ankles and knees. Muscle strength is 5/5 for the upper and lower limbs; however, he has mild atrophy of the foot intrinsic muscles. Cerebellar function is normal and his gait is normal. He feels decreased pinprick sensation on the left lateral chest wall, mid-abdominal area, and lower thoracic area on the left side. He has entirely normal sensory function on the right side. He is tender upon palpation of abdominal muscles on the left side. He also has tenderness on palpation of the left lower chest wall. There is no scapular winging. Heart and lungs are clear.

- *At this point, review your differential diagnosis and revise as appropriate.*
- *Are there additional observations on physical examination that might be helpful in narrowing your differential list?*

**Commentary II**

The sensory loss is band-like over the lower left chest wall and abdomen, suggesting a thoracic root lesion, although isolated intercostal nerve involvement is also possible.

**Physical Examination, continued**

Bone scan and MRI of the thoracic spine were normal. There was no evidence of disc herniation, spinal stenosis, or metastatic lesions involving the thoracic spine. This effectively rules out a structural lesion although isolated intercostal lesions cannot be ruled out.

- *If necessary, revise your differential diagnosis based on the additional physical examination results.*
- *Are there laboratory or other tests that could help you in your differential diagnosis?*

**Electrophysiologic Data**

SENSORY NERVE CONDUCTION									
nr = no response									
NERVE	LATENCY			AMPLITUDE (µV)			CONDUCT VEL(m/s)		
	R	L	Norm	R	L	Norm	R	L	Norm
median sensory wrist	-	3.4	-	-	47.0	>20	-	50.0	-
ulnar sensory wrist	-	3.6	-	-	23.5	>10	-	46.7	-



sural sensory	-	5.5	-	-	6.4	>6	-	30.4	>41
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<b>MOTOR NERVE CONDUCTION</b>									
nr = no response									
NERVE	LATENCY (ms)			AMPLITUDE (mV)			CONDUCT VEL (m/s)		
	R	L	Norm	R	L	Norm	R	L	Norm
median	-	-	-	-	-	-	-	-	-
motor wrist	-	3.9	<4.4	-	17.4	>4	-	-	-
motor elbow	-	8.0	-	-	15.2	>4	-	58.5	>49
ulnar	-	-	-	-	-	-	-	-	-
motor wrist	-	3.5	<3.5	-	8.5	>6	-	-	-
peroneal	-	-	-	-	-	-	-	-	-
motor ankle	-	6.0	<6.1	-	1.6	>2	-	-	-
motor knee	-	14.4	-	-	0.8	>2	-	36.3	>41

<b>F-WAVE</b>								
# = number of stimuli P = persistence CD = chronodispersion F:M = ratio of average F-wave amplitude to M-wave amplitude								
R/L	NERVE	#	LATENCY (ms)			CD (ms)	P (%)	F:M(%)
			min	mean	max			



L	ulnar wrist	-	33.4	-	-	-	-	-
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**ELECTROMYOGRAPHY**

N = normal incr = increased decr = decreased  
 0 = absent 1+ = minimal 4+ = maximal  
 crd = complex repetitive discharge fasc = fasciculation potential  
 myk = myokymic discharge myt = myotonic discharge  
 nmt = neuromyotonic discharge  
 p wave = positive sharp waves fib = fibrillation potentials recr = recruitment  
 amp = amplitude dur = duration poly = polyphasic potential

R/L	MUSCLE	INSERTION		SPONTAN		VOLUNTARY				
		activ	p wave	fib	other	recr	amp	dur	poly	effort
L	biceps brachii	N	0	0	0	N	N	N	N	N
L	triceps	N	0	0	0	N	N	N	N	N
L	FDI (hand)	N	0	0	0	N	N	N	N	N
L	ABD pollicis brevis	N	0	0	0	N	N	N	N	N
L	anterior tibialis	incr	sust	1+	0	N	1 incr	N	N	N
L	medial gastrocnemius	incr	sust	1+	0	N	1 incr	N	N	N
L	FDI (pedis)	incr	sust	2+	0	1 decr	1 incr	1 incr	1 incr	N
L	vastus medialis	N	0	0	0	N	N	N	N	N
L	tensor fascia lata	N	0	0	0	N	N	N	N	N
L	gluteus maximus	N	0	0	0	N	N	N	N	N
L	parasp-lumbosacral	N	0	0	0	N	N	N	N	N
L	parasp-midthoracic	incr	sust	2+	0	N	N	N	1 incr	N
L	parasp-low thoacic	incr	sust	2+	0	N	1 incr	N	1 incr	N



R	parasp-midthoracic	N	0	0	0	N	N	N	N	N
L	rectus abdomius	incr	sust	1+	0	N	1 incr	N	1 incr	N

- *On the basis of both the clinical and evaluation, formulate your final impression. List the most likely diagnosis first and follow in order with the other possibilities that are not excluded by the data. Eliminate those diagnoses not supported by the data.*
- *What other diagnostic procedures are needed?*

**Diagnostic Impression**

Mildly abnormal left lower extremity sampled sensory and motor nerve conduction values with borderline to decreased amplitude, mildly prolonged latencies, and decreased conduction velocities.

**EMG shows:**

1. Fibrillation potentials with motor unit configuration changes in mid and lower dorsal paraspinal muscles and rectus abdominis muscles on the left side.
2. Similar but more mild abnormalities in distal muscles of the left lower extremity.

**Interpretation**

There is electrodiagnostic evidence of left thoracic radiculopathy and a co-existing peripheral polyneuropathy involving the lower extremity. The above findings are likely compatible with diabetes resulting in diffuse sensorimotor peripheral polyneuropathy and a co-existing thoracic radiculopathy on the left side; however, anatomical pathology such as disk herniation or bony pathology cannot be ruled out based upon the electrodiagnostic testing.

Clinical Note: Follow-up MRI did not demonstrate a structural lesion.

**Discussion**

Diabetic thoracic radiculopathy is a rare complication of diabetes mellitus, and typically occurs late in the course. The common differential diagnosis includes thoracic radiculopathy due to metastatic cancer to the thoracic spine, which may be unilateral or bilateral and frequently manifests with significant weight loss. A significant weight loss in diabetic thoracic radiculopathy has been described. The thoracic disk herniation with a radiculopathy may cause unilateral or bilateral radiculopathy and myelopathy. Degenerative disk disease also may produce a similar clinical picture. Herpes zoster can produce similar clinical picture; however, EMG changes in the thoracic, intercostal, and abdominal muscles are not generally found. Intra-abdominal or intrathoracic pathology may cause similar clinical manifestations and require appropriate diagnostic work-up. In addition to bone scan and/or MRI scan of the dorsal spine, a lumbar puncture may be done, which may show nonspecific abnormal findings such as increased protein level. Diabetic thoracic radiculopathy may cause significant persistent pain which may be treated with sodium channel blockers (anti-convulsants), tricyclic antidepressant medications, and pain medications as needed. Diabetic thoracic radiculopathy is generally a monophasic, self-limited process, with most patients eventually improving with or without treatment.



## Bibliography

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