



EMG CASE No. 65, October 2003

Presenting Symptom(s): Left neck ear numbness and pain.

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Appropriate Audience: Residents and practicing physicians

Learning Objectives: After completing this educational activity, participant will be able to:
1) identify greater auricular mononeuropathy, 2) perform a greater auricular nerve study,
and 3) develop a differential diagnosis in regards to neck and ear numbness.

This case is no longer available for CME credit.

History

A 57 year old woman with a history of NIDDM presents for electrodiagnostic evaluation of pain and numbness located in left ear and posterior neck, present for about 3 months. She awoke one night with these symptoms at that time. There was no prior history of any problem in this area.

- Prior to continuing, please develop a differential diagnosis and list each possible diagnosis in order of likelihood.
- Is there any additional information regarding the clinical history that might be helpful in clarifying your differential list or changing its order of priority?

Differential Diagnosis:

1. Cervical radiculopathy
2. Myofascial pain
3. Greater auricular mononeuropathy
4. Lesser occipital mononeuropathy
5. Central nervous system pathology (MS, CVA)

Commentary I

The onset of symptoms was acute as she woke up with numbness. This may point to a compressive mononeuropathy related to neck position while sleeping. However, clinically one does not often see mononeuropathies in this location. High cervical radiculopathy must also be considered. The dermatome consistent with this patient's symptoms would be C2 or C3.

History, continued

She denies weakness. The numbness started 3 months ago after waking up from sleep and has been slowly improving. She does not recall sleeping in an unusual position. Upon further questioning, the 'pain' appears to be more like a dysesthesia. She denies any allodynia. The ear is not painful to the touch. There are no particular positions that make her symptoms better or worse.



She has no other significant past medical history and does not smoke, drink, or use illicit drugs. She has no other history of previous neck pain or neck trauma. No imaging studies have been performed to this point.

- If necessary, revise your differential diagnosis based on the additional clinical history.
- On which details of the physical examination should you focus at this point?

Commentary II

The patient's history of diabetes makes her more susceptible to entrapment neuropathies. A high cervical radiculopathy remains a possibility. Imaging of the cervical spine may be helpful as a screen for clinically relevant structural abnormalities in the cervical spine.

Physical Examination

The physical examination reveals mildly decreased pinprick sensation over the skin of the left ear. Motor strength is intact in both upper extremities and the face. Cranial nerves are intact bilaterally. Neck range of motion is normal. Biceps, triceps, and brachioradialis reflexes are 2+ and symmetric.

Differential Diagnosis:

1. Greater auricular mononeuropathy.
 2. Myofascial pain
 3. Cervical radiculopathy
 4. Central nervous system pathology
 5. Lesser occipital mononeuropathy
- 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 III

The physical examination findings of intact strength and reflexes make a lower cervical radiculopathy less likely. A central nervous system process cannot yet be excluded but is less likely secondary to the focal nature of the symptoms and the lack of upper motor neuron findings. As with any entrapment mononeuropathy, it may be helpful to attempt to elicit a Tinel sign. The greater auricular nerve, which is responsible for sensation to most of the ear, emerges immediately posterior to the sternocleidomastoid.

Physical Examination, continued

Spurling's maneuver is negative. There is a positive Tinel sign, with tingling in the left ear following tapping along the posterior edge of the sternocleidomastoid muscle.

- If necessary, revise your differential diagnosis based on the additional physical findings.
- Design your approach to the electrophysiologic examination based on the existing data.

Commentary IV

The positive Tinel sign with tapping over the greater auricular nerve as well as the distribution of the numbness makes a greater auricular mononeuropathy the most likely diagnosis. The greater auricular nerve in the neck is easily susceptible to injury due to the superficial position of the nerve in this region.

Bilateral greater auricular nerve studies were performed using a technique described by Dr. Palliyath (see Bibliography). Due to the lack of normative data, the left side was compared to the right side. Two surface disc electrodes, 9 mm in diameter, were placed 2 cm apart on the back of the ear lobe (active electrode proximal). The ground electrode was placed on the back of the neck. The nerve was stimulated with a bipolar surface-stimulating electrode held firmly against the lateral border of the sternocleidomastoid muscle (cathode distal), at a point 7 cm proximal to the active electrode. A pulse of .1 msec duration was applied, and stimulus intensity was gradually increased. The sweep speed was set at 1 msec/division and the gain was set at 20 uV/division. The latency was measured from the stimulus onset to the negative peak of the potential and the amplitude was measured from the take off to the peak of the negative phase. Skin temperature was 32.5 degrees Celsius.

See figure 1 for diagram of greater auricular nerve anatomy and nerve conduction setup.

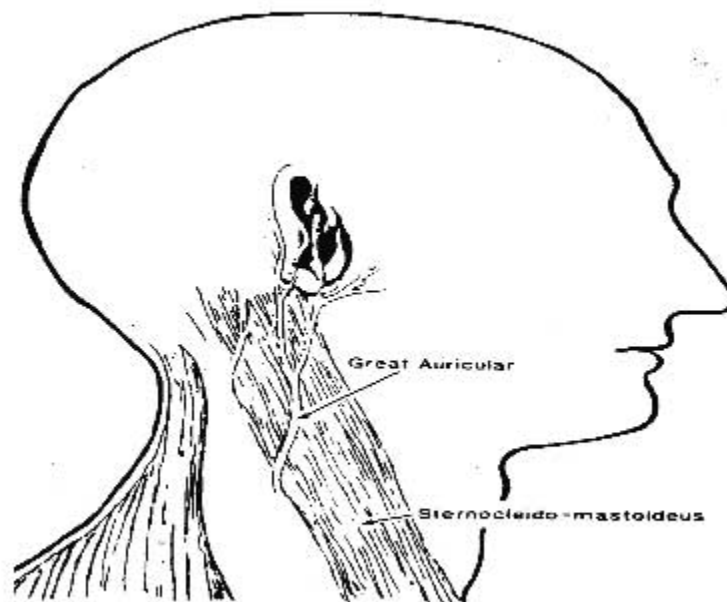


FIGURE 1. Anatomy of the greater auricular nerve.



Electrophysiologic Data

SENSORY NERVE CONDUCTION STUDIES							
NERVE	SIDE	STIM SITE	RECORD	Cm	AMPL	PeakLAT	CV
Greater Auricular	R	Sternocleidomastoid	Ear	7	6.1	1.8	39
Greater Auricular	L	Sternocleidomastoid	Ear	7	NR	NR	

MOTOR NERVE CONDUCTION STUDIES							
NERVE	SIDE	STIM SITE	RECORD	cm	AMPL	LAT	CV
Facial Motor	L	Mandible	Orbicularis Oculi		2.3	3.1	
Blink Reflex R1	L	Supraorbital notch	Orbicularis Oculi			11	
Blink Reflex R2	L					35.3 34.9 (R)	
Blink Reflex R1	R					12.2	



Blink Reflex R2							35 34.9 (L)	
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NEEDLE ELECTROMYOGRAPHY									
INSERtional activity: N, sust, unsust									
FIB: 0, 1+, 2+, 3+, 4+									
OTHer: 0 or fascic, myotonia, myokymia									
EFFort: N, dec									
RECruitment: N, inc or dec 1+, 2+, 3+, 4+									
AMPlitude: N, inc or dec 1+, 2+, 3+, 4+									
DURation: N, inc or dec 1+, 2+, 3+, 4+									
POLyphasia: N, inc or dec 1+, 2+, 3+, 4+									
R/L	MUSCLE	INSER	FIB	OTH	EFF	REC	AMP	DUR	POL
L	Cervical Paraspinals	N	0	0					

- On the basis of both the clinical and electrophysiologic evaluations, formulate your diagnostic 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.
- Are there additional electrophysiologic data that you feel would further delineate the diagnosis? (Remember, collecting data that are not needed for the diagnosis is costly and uncomfortable for the patient.)

Electrophysiologic Data, continued

The greater auricular nerve response was recorded over the posterior earlobe and was stimulated 7 cm inferior and posterior to the sternocleidomastoid. The conduction velocity on the right was 39 m/sec, which is low normal (normal=46.8m/sec +/- 6.6 as described by Palliyath). The motor evoked amplitude was normal (6.1mV). There was no response on the left side.

- Make the final revisions of your diagnostic impression(s).

Disgnostic Impression

Abnormal examination. There is electrodiagnostic evidence of a complete greater auricular mononeuropathy on the left of indeterminate age. There is no electrodiagnostic evidence of cranial nerve V or VII neuropathy, or of a high cervical motor radiculopathy on the left. The borderline slowed conduction velocity on the right side is of uncertain clinical significance and may be related to age or diabetes; lack of age adjusted normative data may confound the findings. The significant differences between right and left were most helpful in confirming the diagnosis. Also, a cervical plexus process cannot be electrodiagnostically



excluded; however, clinically it is less likely given the very localized area of the patient's symptoms.

- What other diagnostic procedures (laboratory tests, etc.), if any, are needed?
- What treatment would you recommend?

Other diagnostic procedures are not necessary at this time. The patient was advised to not sleep on her left side and to refrain from any activity that may put pressure onto the left side of her neck as that may induce a compression of the greater auricular nerve. She has noticed improvement. However, follow up nerve conduction studies could be performed to assess for recovery.

Commentary V

The greater auricular nerve is susceptible to injury due to its anatomical location. It can be affected in leprosy and hereditary hypertrophic neuropathies. It is a purely sensory nerve and is the largest ascending branch of the cervical plexus. It is derived from C2 and C3 nerve roots. It is sometimes palpable and visible in some normal adults. This nerve can be assessed electrodiagnostically.

A study done by Palliyath (see bibliography) tested 20 healthy volunteers. Ages ranged from 21 to 66 and both sides were examined. No significant differences between the right and left recordings were noticed for any measure. The average of right and left combined recordings was 1.7 +/- 0.2 msec for latency, 46.8 +/- 6.6 m/sec for conduction velocity, 12.7 +/- 4.1µv for amplitude, and 0.8 +/- 0.2msec for duration.

Bibliography

1. Palliyath SK. A technique for studying the greater auricular nerve conduction velocity. *Muscle Nerve*. 1984 Mar-Apr;7(3):232-4.