

Title Page

L5 radiculopathy causing ipsilateral absent superficial peroneal sensory response

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Abstract

A dogma in neurophysiologic studies states that an absent/reduced sensory nerve action potential implies a lesion at the level/distal to the dorsal root ganglion. Radiculopathies being proximal to the dorsal root ganglion generally have normal sensory nerve action potentials.

A 28-year-old patient presented with right lower extremity radicular symptoms. Nerve-conduction-studies revealed an absent right superficial peroneal sensory response. MRI of the lumbosacral spine showed a right L4-5 disc extrusion compressing the L5 nerve root.

An isolated absent superficial peroneal sensory nerve action potential may rarely occur if the dorsal root ganglion is located within the intraspinal canal or proximal to the intervertebral foramen and doesn't exclude an L5 radiculopathy.

L5 radiculopathy causing ipsilateral absent superficial peroneal sensory response

Dear Sirs,

A 28-year-old gentleman presented with a 4 month history of tingling sensation in his right calf muscle that over weeks progressed to pain radiating from the lower back to the right calf. He also described numbness over the lateral border of his right foot up to the ankle area.

Manual muscle testing revealed a medical-research-council grade of 4/5 of the right extensor hallucis longus, with the rest of the neurologic examination being normal.

Nerve conduction studies (NCS) showed an absent right superficial peroneal SNAP, moderately reduced amplitude of the right peroneal compound muscle action potential and mildly prolonged latency with reduced amplitude of the right tibial H reflex.

Needle electromyography (EMG) showed increased insertional activity and abnormal spontaneous activity in the form of fibrillation potentials and positive sharp waves in the right tensor fascia lata, tibialis posterior, peroneus longus as well as the right lumbosacral paraspinals. Increased insertional activity was also noted in the right tibialis anterior and the right medial gastrocnemius. An increased percentage of high amplitude, long duration polyphasic units with mildly reduced recruitment were noted in the right tensor fascia lata, tibialis posterior, peroneus longus, tibialis anterior and medial gastrocnemius.

In summary, the NCS/EMG was suggestive of active right-sided L5-S1 radiculopathy.

Magnetic-resonance-imaging (MRI) of the lumbosacral spine showed a right paracentral disc extrusion on the right effacing the lateral recess and compressing the right L5 root as it exits the thecal sac. (Figure 1)

A rule in electrodiagnostic studies states that an absent or reduced sensory nerve action potential (SNAP) implies a lesion at the level or distal to the dorsal root ganglion (DRG).

Radiculopathies, being proximal to the DRG generally have normal SNAPs. It is postulated that an absent superficial peroneal SNAP in an L5 radiculopathy occurs if the DRG is located within the intraspinal canal or proximal to the intervertebral foramen. Though the classical teaching is that the DRG resides within intervertebral foramen, different studies using various techniques to localize the DRG have confirmed that the L5 DRG may be located in the intraspinal canal [1]. Techniques used to localize the DRG ranged from radiographic studies to post-mortem analysis. This location makes it vulnerable to compression from disc prolapse or joint disease leading to axon loss along peripheral sensory fibers with resulting loss of the distally evoked SNAP. In a prospective study by Mondelli et al., they demonstrated how lumbosacral radiculopathies from herniated discs result in reduced or absent SNAPs in only 7% of cases [2]. This confirms how rare this occurrence is and that the electrophysiological dogma stating that SNAPs have normal amplitude in radiculopathies, stands most of the time, broken only in exceptional cases.

References:

1 Levin KH. L5 radiculopathy with reduced superficial peroneal sensory responses: intraspinal and extraspinal causes. (1998) Muscle Nerve.21:3-7.

2 Mondelli M, Aretini A, Arrigucci U, Ginanneschi F, Greco G, Sicurelli F. Sensory nerve action potential amplitude is rarely reduced in lumbosacral radiculopathy due to herniated disc.(2013) Clin Neurophysiol.124:405-9.

Legend:

Fig 1 Lumbosacral MRI. **a.** L4-5 disc prolapse on sagittal MRI (arrow) **b.** L4-5 right paracentral disc extrusion compressing right L5 nerve root as it exits the thecal sac (arrow)