Neurosciences Quiz

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Role of dermatomal somatosensory evoked potential in localizing the site of transverse myelitis

Clinical Presentation

A 12-year-old female, with mild upper respiratory tract infection one month ago, presented with bilateral lower limb weakness and urinary retention for one day. She felt sudden numbness in both thighs then weakness of both legs that progressed to inability to walk within 6-10 hours. There was no history of back pain, no trauma, no fever, no breathing or swallowing difficulty. Power was reduced to 1/5 in both ankles, and 3/5 in both knees and hip movements. Ankle jerk was absent bilaterally on presentation and mute planters. Knee jerk was normal on the right and exaggerated on the left. There were no sensory changes in the lower limbs. An MRI of the lumbosacral spine and CT brain were normal. Sensory-motor conductions including F wave study were normal. The H-reflexes and tibial somato-sensory evoked potentials were normal. She was given pulse steroid therapy and Acyclovir. She started moving her ankles with power 2/5, both ankle jerks were exaggerated with upgoing planters.

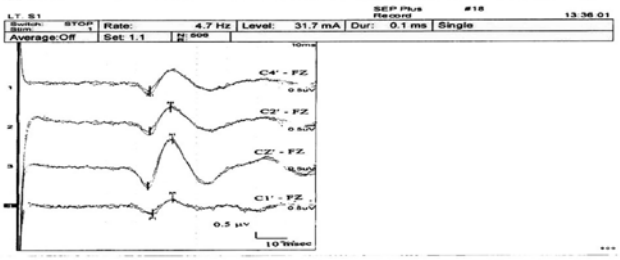

Figure 1 - The DSSEP study was carried out by placing densely packed recording electrodes 2 cm behind the central transverse array of international 10-20% system of EEG recording. Stimulation was carried out by placing electrodes in the cutaneous dermatomes, especially areas of subjective changes of sensation (called signature areas). Note that the best P1 and N1 potentials were recorded in the CZ'-FZ derivation. The P1 latency is 44 msec (normal). DSSEP - dermatomal short latency somatosensory evoked potentials.

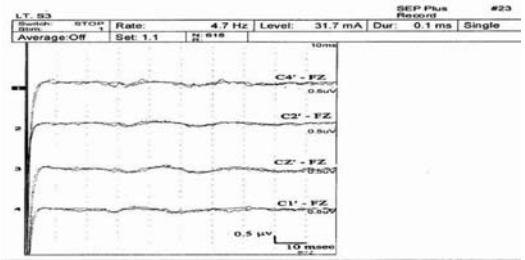

Figure 2 - The DSSEPs simulating the S2 dermatome at the back of the thigh. Note that P1 and N1 potentials were absent. DSSEP - dermatomal short latency somatosensory evoked potentials.

Questions:

1. How do you explain the persistence of H-reflex in the absence of ankle jerk?

2. What are the additional preferred electro-diagnostic tests, and why?

3. In view of the DSSEP, where do you localize the lesion (anatomically)?

4. What is the final diagnosis?

Answers

1. The H-reflex is an electrical correlate of the S1 tendon ankle jerk. It is an objective test not influenced by the subject's cooperation. Therefore, the association of persistence of H-reflex and absence of ankle jerk may occur in some patients. On the other hand, in the presence of ankle jerk clinically, H-reflex is almost always present. A depressed ankle jerk may be associated with prolonged H-reflexes, such as in polyneuropathy, proximal tibial and sciatic neuropathy, lumbosacral plexopathy, and lesions of the S1 root.

2. The dermatomal short latency somatosensory evoked potential (DSSEP) study was carried out for exact localization of the site of the functional lesion, especially to identify the segments of the spinal cord involved.

3. The sites of the lesion were S2 and S3 spinal segments/conus medullaris. It should be noted here that L5 and S1 segments were spared as indicated by their normal DSSEPs.

4. Transverse myelitis involving conus medullaris.

Discussion

Transverse myelitis is a syndrome characterized by rapid onset of limb weakness, sensory disturbance, bowel, and bladder dysfunction caused by inflammation of the spinal cord with variable recovery.[2] The syndrome is usually associated with parainfectious and auto-immune diseases.[3] Reaching a diagnosis, the evidence of inflammation within the spinal cord is necessary and that is aided by tests such as MRI, CSF study, and blood tests. Short latency somatosensory evoked potentials offer a physiologic look at the dorsal column pathway, and are used to localize lesions[4] with poor yield. Dermatomal SSEP, a method for stimulating individual dermatomes and recording SSEP from the scalp, is another non-invasive test that plays a superior role in localizing lesions in and around the spinal cord.[5,6] In our patient, initial MRI and tibial SSEPs were normal. Further study, applying DSSEP by stimulating 'signature dermatomes' with higher intensity of stimulus, revealed S2 and S3 lesions bilaterally. These findings correlate with the advanced MRI study using high resolution of 3 Tesla.

Acknowledgment. *The authors would like to extend their thanks to Waleed Khoja, Sonia Khan, Nabil Biary, Mujtaba Khan, Merlyn Navarro, and Mylin Baile, from the Division of Neurology, Riyadh Military Hospital, Riyadh, Kingdom of Saudi Arabia for all their kind assistance in preparation of this quiz.*

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