

The Significance of a Triple Flexion Reflex in the Acute Spinal Cord Injured Patient: A Case Report and Review of the Literature

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ABSTRACT

SETTING

University-based hospital emergency department.

PATIENT

An 83-year-old woman with a past medical history of dementia and recent ischemic stroke presented after fall from standing.

CASE DESCRIPTION

She was found down by nursing home personnel. Her initial assessment at an outside hospital documented a C5 fracture without canal compromise and volitional lower limb movement. Deemed neurologically intact from the fall, she was transferred to our institution for routine management of the spine fracture six hours post injury. Initial physiatric assessment, revealed trace toe movement below the C5 neurological level with a lower limb flexion withdrawal response to stimulus of the lower limbs. She was classified as having a C5 ASIA impairment scale C spinal cord injury (SCI).

DISCUSSION

Because of misinterpretation of the triple flexion response (TFR) as volitional movement, diagnosis of acute SCI was delayed. The TFR is defined as hip and knee flexion and ankle dorsiflexion. Usual onset is at one to three days post injury and peaks at one to four weeks post injury. It is postulated that pre-existing subclinical myelopathy may contribute to early reflex recovery in older individuals. Minor stimuli may activate this reflex or it may occur spontaneously. With pre-existing upper motor neuron disease, our patient exhibited a TFR while testing for a Babinski response at six hours post injury.

CONCLUSION

Triple flexion response should not be misinterpreted as volitional movement in a cognitively dysfunctional patient as this risks acute spine mismanagement. Immobilization of the spine, imaging, and consideration of pharmacologic and surgical management should not be delayed. Education of first response physicians may prevent delayed assessment and treatment.

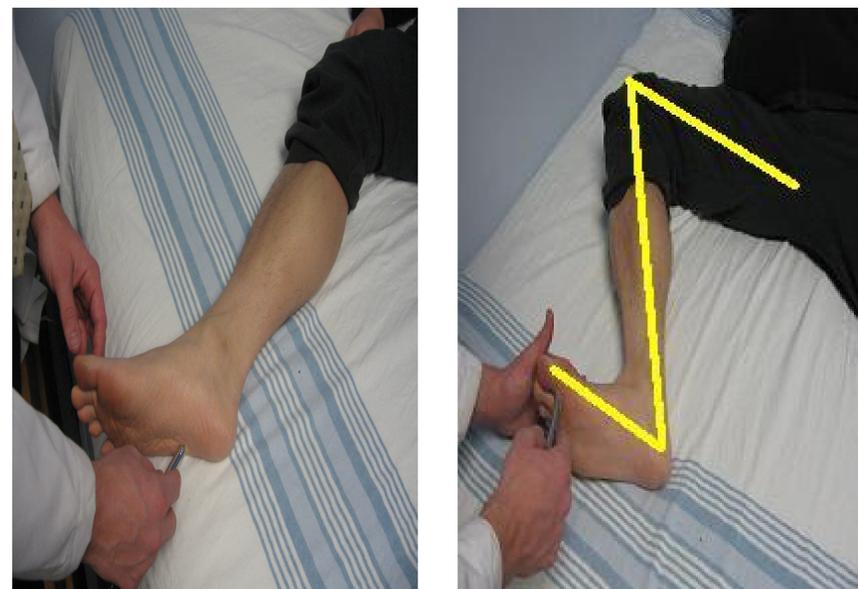
DISCUSSION

The Triple Flexion Reflex or Response (TFR) is defined as flexion of the thigh, leg, and dorsiflexion of the foot upon noxious stimulus of the foot.¹ In 1881 it was described by Sherrington in dogs.² In 1896 Babinski described it in humans as "Phenomene des orteils" - "pricking of the sole ... results in flexion of the thigh on the pelvis, of the leg on the thigh, and of the foot on the leg, but the toes, instead of flexing, execute a movement of extension upon the metatarsus."³ Its usual onset is at 1-3 days post injury, but it peaks at 1-4 weeks post injury (Table 1).⁴ It has been postulated that pre-existing subclinical myelopathy contributes to early reflex recovery in older individuals.⁵ When the response is exceptionally active, minor stimuli will elicit it; occasionally there is a spontaneous response, and there may be a bilateral response.⁶

Table 1: Recovery of Reflexes: Four Phases of Spinal Shock (4)

	0-1 day	1-3 days	1-4 weeks	1-12 months
DPR	+++	+++	+/0	+/0
BC reflex	+/0	++	++	++
AW reflex	+/0	++	++	++
CM reflex	+/0	++	++	++
Babinski sign	0	+	++	++
TRIPLE FLEXION REFLEX	0	+/0	++	+++
DTRs	0	+/0	++	+++
Tibial H-reflex	0	++	+	+++
Extensor spasm	0	0	0	+++
Interlimb reflexes	0	0	0	+++
Reflex neurogenic bladder	0	0	0	+++
Autonomic hyper-reflexia	0	0	0	+++

Figure 1: Triple Flexion Reflex



A. Application of Stimulus to Lateral Foot

B. TFR; Hip Flexion, Knee Flexion, and Dorsiflexion of the Foot

CASE REPORT

HISTORY

An 83 yo female nursing home resident with a PMH significant for senile dementia and recent ischemic brain infarct presented after a fall to a community-based ER with a C5 fracture without canal compromise on CT Scan of C-Spine. Upon transfer to our institution for management of the spine fracture, MK was not recognized to have a true SCI upon initial examination. She remained in a cervical collar, but methylprednisolone was not administered.

PHYSICAL EXAMINATION

MK was confused and took significant motivation to follow simple commands. Sensation to light touch and pin prick (PP) were diminished or absent below C5 with sacral sensation to PP spared. Full 5/5 strength of the biceps otherwise absent below C5 with exception of 1/5 wiggle on left great toe. At only 6 hours post-injury MK had a profound TFR to minor stimulus of the both feet and medial thighs (see Fig 1). Stimulus of the right medial hamstring induced a bilateral TFR. There were incidents of spontaneous TFR.

IMAGING

•**MRI CERVICAL SPINE WITHOUT CONTRAST** demonstrated abnormal signal within cervical spinal cord from levels of C2 through C6-C7 with suggestion of cord compression.

•**CT HEAD OR BRAIN WITHOUT CONTRAST** showed encephalomalacia of the occipital pole and the frontal gyrus, most likely old infarcts.

RESULTS

MK was classified a C5 AIS C SCI. Her power of attorney elected against surgery and was transferred to an inpatient rehabilitation facility.

CONCLUSIONS

The TFR is a sign of upper motor neuron impairment. It does not typically appear for several days after an injury but in patients with pre-existing myelopathy, an early onset exaggerated Babinski response exhibited as a TFR may occur. It is important not to misinterpret such responses as volitional movements, particularly in patients with cognitive dysfunction where the history and physical examination may be limited. Failure to immobilize the spine and to administer adjunct steroid therapy may be detrimental to the patient. Education of initial response physicians may prevent overlooking an acute SCI.

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