EUROPEAN JOURNAL OF NEUROLOGY
THE OFFICIAL JOURNAL OF THE EUROPEAN FEDERATION OF NEUROLOGICAL SOCIETIES

Journal:	*European Journal of Neurology*
Manuscript ID:	Draft
Wiley - Manuscript type:	
Date Submitted by the Author:	n/a
Complete List of Authors:	Huang, Hui-Chun; China Medical University Hospital, Neurology
Keywords:	

Posthypoxic Cortical Myoclonus Mimicking Spinal Myoclonus- electrophysiological and functional MRI manifestations

Hui-Chun Huang[a],M.D., Jui-Cheng Chen[a],M.D., Ming-Kuei Lu[a],M.D., Jin-Ming Chen[b],M.S., Chon-Haw Tsai[a,c,d],M.D.,Ph.D.

[a]Department of Neurology ;[b]Department of Radiology;[c]School of Medicine, College of Medicine;[d]Graduate Institute of Neural and Cognitive Sciences, China Medical University and Hospital, Taichung, Taiwan

Correspondence: Dr. CH Tsai or MK Lu, Department of Neurology, China Medical University Hospital, 2, Yuh-Der Road, 404 Taichung, Taiwan

TEL:+886-4-22062121 EXT.5035 FAX:+886-4-22344055

E-mail:windymovement@yahoo.com.tw(CH Tsai), Lu@med.uni-frankfurt.de(MK Lu)

Word count: 750

Sir,

Hypoxia-induced cortical myoclonus usually manifests with multi-focal or generalized jerks. We studied an unusual case presenting with only legs jerks by electrophysiological and functional magnetic resonance imaging (fMRI) investigations. A 48-year-old woman suffered an event of thoracic back compression by a falling 500-kilogram pack of paper complicated with asphyxia, cyanosis and consciousness loss. She was rescued probable 15 minutes later with endotracheal intubation and was admitted in intensive care unit for 5 days. She developed involuntary leg jerks on the eighth day after the accident. Neurological examination revealed spontaneous and action- triggered myoclonus at lower extremities, more prominent on the right, with no jerks of the upper limbs. Multi-channel electromyography (EMG) illustrated short duration (<30 ms) myoclonic bursts (Figure 1a). Jerk-locked backaverage recording triggered by right tibialis anterior EMG burst disclosed an electroencephalographic (EEG) event 26 ms prior to the myoclonus (Figure 1b). fMRI revealed increase of cortical BOLD effect especially on eliciting jerks by dorsiflexing the right foot (Figure 1c). MRI findings of the brain and thoracic cord were unremarkable. She gave informed consent before receiving studies. Her symptoms were ameliorated by levetiracetam and clonazepam. She could walk with trivial leg myoclonus under the same treatment formula at 1-year follow-up.

Based on the level of origin, myoclonus can be classified into cortical, subcortical and spinal myoclonus [1-2]. Patients with cortical myoclonus usually have focal or multi-focal jerks. The EMG bursts are usually shorter than 50 ms and jerk-locked EEG event may be recorded [1-2]. Spinal myoclonus contains segmental- and proprio- spinal myoclonus [3-4]. Among them, propriospinal myoclonus is characterized by non-rhythmic jerks of the trunk and low limbs with jerk duration longer than 100 ms [4]. The leg myoclonus and a history of thoracic back compression of current patient led us initially to speculate that her myoclonus was spinal origin. However, the short duration EMG bursts and the jerk locked EEG event of backaverage recording indicate that her leg myoclonus is of cortical origin. Since there was a history of transient asphyxia with consciousness loss, posthypoxic myoclonus (PHM) could be the most possible etiology [5]. PHM may appear after a lag period and may manifest with action myoclonus which mainly involved four limbs [5]. It is quite unusual for chronic PHM to be confined only over the lower limbs. To further investigate the unique manifestation, fMRI was conducted. The BOLD activities of bilateral cortical areas, particular the motor cortex of legs, were more robustly enhanced when patient dorsiflexed her right foot as compared with the left foot (Figure 1c). The fMRI findings may infer the reason why the patient's jerks were more vigorous on the right leg than those on the left. Although myoclonus was only

found at lower limbs, the extensive BOLD effect in the fMRI during right foot dorsiflexion may suggest that the cortical activities could be more widespread than supposed to be.

Acknowledgements

The study is granted by China Medical University Hospital (DMR-97-056).

References

1. Shibasaki H, Hallett M. Electrophysiological studies of myoclonus. *Muscle Nerve* 2005; 31: 157-174.

2. Obeso JA, Rothwell JC, Marsden CD. The spectrum of cortical myoclonus. From focal reflex jerks to spontaneous motor epilepsy. *Brain* 1985; 108: 193-124.

3. Jankovic J, Pardo R. Segmental myoclonus. Clinical and pharmacologic study. *Arch Neurol* 1986; 43: 1025-1031.

4. Brown P, Thompson PD, Rothwell JC, Day BL, Marsden CD. Axial myoclonus of propriospinal origin. *Brain* 1991; 114: 197-214.

5. Venkatesan A, Frucht S. Movement disorders after resuscitation from cardiac arrest. *Neurol Clin* 2006; 24: 123-132.

Figure 1

(a) Multi-channel EMG illustrates spontaneous jerks of the legs with a spell of vigorous burst (arrow) to involve both legs symmetrically. Event analysis (right upper) of bilateral TA of a 9-second epoch reveals that the jerks are mostly asynchronous. However, the vigorous synchronous jerks of the homologous TA can also be illustrated at the 0-point peak with background asynchrony in the event correlation analysis figure (right lower).

(GC:gastrocnemius; TA:tibialis anterior; Hamstr:hamstring; QC:quadriceps femoris)

(b) Jerk-locked backaverage recording.

(c) Functional MRI recording by requesting the patient to dorsiflex right (upper) or left (lower) foot.