Susceptibility Weighted Images Identifies Pallido-Reticular Lesions in Carbon monoxide intoxication Patients, which is associated with poor Parkinsonian Features

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Introduction:

Carbon monoxide intoxication secondary to charcoal burning is the most common method for committing suicide in Taiwan[1]. The survivor frequently showed Parkinsonian symptoms[2], which is associated with white matter lesions[3]. Because the pathological data emphasised the necrosis or haemorrhaging of the basal ganglion area, the current study proposed to use susceptibility weighted imaging (SWI) to investigate the extent of vascular damage, as associated with clinical outcome.

Materials and Methods:

The study was approved by the local Institutional Review Board. All participants gave written informed consent. Twenty-five patients (11 males and 14 females) after carbon monoxide intoxication and 25 age- and sex-matched controls were enrolled for detailed neurological examinations, cognitive testing and susceptibility-weighted imaging. MR images were acquired using a 3.0T MRI scanner (Excite, GE Medical Systems, USA). The SWI used the following parameters: TR/TE/flip angle = 35 ms/14 ms/40°, 52 slices, thickness = 2 mm, matrix size = 512 × 512, and field of view = 80 × 130 mm. The post-processing followed the procedure from Haacke et al[4]. In brief, the k-space data were filtered, the phase unwrapped and normalized. A minimum intensity projection (mIP) was performed and overlaid on the magnitude image.

Results and Discussion:

The figure showed low-intensity pallidoreticular lesions detected in the mIP of SWI (a), whereas inhomogeneous intensities were noticed in the globus pallidus (arrow). The corresponding T1-weighted images (b) and T2-weighted (c) images were usually normal. The pallidoreticular lesion was only visible in 7.7% patients from the T1-weighted images and in 15.4% from the T2-weighted images. The table showed that patients with pallidoreticular lesions have increased parkinsonian features, compared to those without. They also have poorer performances on the neuropsychiatric tests (data not shown).

Conclusion:

The sensitivity for detecting pallidoreticular lesions can be greatly improved by susceptibility-weighted imaging compared with conventional imaging. The presence of pallidoreticular lesions after carbon monoxide intoxication indicates a poorer cognitive state, which could be associated with extensive grey and white matter damage in addition to the damage to the nigra-striatal neuronal networks.

References: 1. (Kuo et al, Social Psychiatry and Psychiatric Epidemiology 2008; 43: 286-90.) 2. (Chang et $al.,$ Journal of Psychiatry & Neuroscience 2010a; 35: 115-25.) 3. 3 (Sohn et $al.,$ Arch Neurol 2000; 57: 1214-8.) 4. (Haacke et $al.,$ J Magn Reson Imaging 2009; 29: 537-44.)
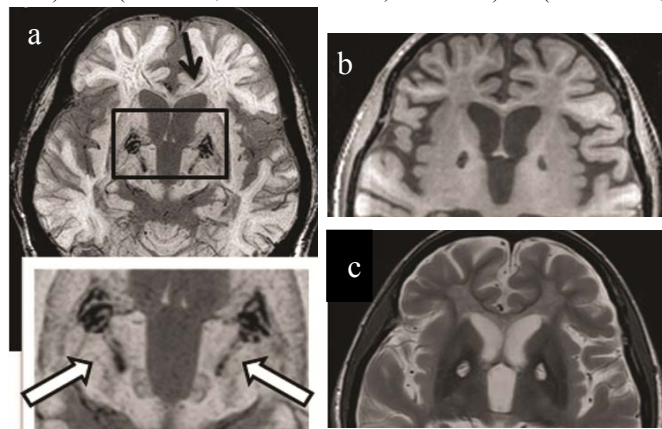
	No lesion (n=12)	With lesion (n=13)
Bradykinesia (n)	3	9
Postural instability (n)	1	6
Rigidity (n)	4	11
Gait disturbance (n)	2	10
UPDRS motor score	4.25 ± 2.8	10.38 ± 4.8
Myoclonus (n)	0	3
Dystonia (n)	0	2