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Vaka Raporu– Case Report

MAGNETIC RESONANCE IMAGING FINDINGS OF CARBON MONOXIDE POISONING

KARBON MONOKSİT ZEHİRLENMESİNİN MANYETİK RESONANS GÖRÜNTÜLEME BULGULARI

Makbule VARER[1], Merve GÜRSOY[2*], Melda APAYDIN[1], Fazıl GELAL[1], Orhan OYAR[1], Berna Dirim METE[2]

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Özet

Karbon Monoksit zehirlenmesi önlenebilir bir durumdur ve genellikle hatalı çalışan ısıtma sistemlerinden, yanlış havalandırılan motorlu taşıtlardan ve konut yangınlarından kaynaklanır. Aynı zamanda intihar girişimi olarak da gözlenmektedir. Globus pallidus beyinde en çok etkilenen bölgedir. Tipik bulgular, BT'de globus pallidus bölgesinde hipodens görünümü içerir. Etkilenen alanlarda MRG'de T1 ağırlıklı görüntülerde düşük sinyal ve T2 ağırlıklı görüntülerde yüksek sinyal ve difüzyon ağırlıklı görüntülerde yüksek difüzyon sinyaline sahiptir. Dört hastada MRG'de karbon monoksit zehirlenmesi bulgularını sunmayı amaçladık.

Anahtar kelimeler: Karbon monoksit, Manyetik rezonans görüntüleme, Globus pallidus

Abstract

Carbon monoxide poisoning is a preventable situation and is commonly caused by malfunctioning heating systems, improperly ventilated motor vehicles, and residential fires. It is also observed as an attempt to commit suicide. Globus pallidus is the most commonly affected region in the brain. Typical findings include low attenuation in the globus pallidus region on CT. Affected areas have low signal intensity on T1-weighted image and high signal intensity on T2-weighted image and increased diffusion signal on diffusion weighted image on MRI. We aimed to present MRI findings of carbonmonoxide poisoning in four patients.

Keywords: Carbon monoxide, Magnetic resonance imaging, Globus pallidus

[1]Katip Celebi University Ataturk Training and Research Hospital, Department of Radiology, Izmir/Turkey,
[2]Izmir Democracy University Faculty of Medicine, Department of Radiology, Izmir/Turkey, * E-mail: gursoymerve@yahoo.com, ORCID ID: 0000-0001-6408-3915, 0000-0002-1225-2526, 0000-0001-6408-3915, 0000-0003-1263-0918, 0000-0003-2309-7514, 0000-0002-2380-4197.

MAGNETIC RESONANCE IMAGING FINDINGS OF CARBON MONOXIDE POISONING

1. INTRODUCTION

Carbon monoxide (CO) is a colourless, odourless, tasteless and nonirritating toxic gas which can cause neurological mortality and morbidity. Poisoning may occur because of smoke from fires, misuse of non-electric cooking and heating devices burning fuel and snow obstructed exhaust system of motor vehicles. Clinical presentation of CO poisoning depends on the duration and intensity of the exposure. Moderate severity intoxication symptoms include malaise, headache, nausea, vomiting and memory problems (Mehta SR et al., 2007,p.362, Rosenthal LD, 2006, p.40, Johnson CD, 2005, p.315). More severe intoxications are characterized by overt neurological findings. Magnetic Resonance Imaging (MRI) findings depend on the severity of intoxication. Globus pallidus is the most commonly affected region in the brain. In herein we aimed to present typical MRI findings of carbonmonoxide poisoning in four patients.

2. CASE REPORT

Patient one was a 64-years-old woman. She was brought to the emergency room because of muteness, immobility and loss of social relation. She had high signal intensity on T2-weighted and FLAIR MR images on both globus pallidus (Figure 1A, 1B). Patient two was a 46-years-old man who had unconsciousness and respiratuary distress.. He also had increased signal intensity on both globus pallidus on T2-weighted and FLAIR MR images (Figure 2A, 2B). Patient three was a 48-years-old woman who fainted at home because of CO intoxication. She had the same MRI findings with the other patients, in addition she had small hiperintense changes on the left substantia nigra and on the white matter areas (Figure 3A, 3B). Patient four was a 57-years-old man who had unconsciousness, urinary incontinance and motor defisit. He had increased signal intensity on the bilateral frontal lobe, putamen, caudate nucleus and globus pallidus on T2-weighted images. Diffusion-weighted images showed bilateral, symmetric hyperintence lesions on the frontal and parietooccipital white matter (Figure 4). All of the patients were poisoned because of the gas from a heating device. All of them had normal CT images except patient one who had cerebral atrophic changes due to her age. Patients improved

3. DISCUSSION

with supportive therapy (hyperbaric oxygen). Verbal consents were obtained from the patients' relatives for this case report.

Possible mechanism of CO toxicity includes decrease in oxygen carrying capacity of blood, alteration in dissociation characteristic of oxyHb further decreasing oxygen delivery to tissues, decrease in cellular respiration by binding with cytochromes, binding to myoglobin causing myocardial and skeletal muscle dysfunction resulting in impaired tissue perfusion. The most common site of involvement is bilateral globus pallidus. Also abnormalities can be found in other basal ganglia structures, cerebral white matter, corpus callosum, hippocampus, cerebral cortex and cerebellum. The most common involvement of globus pallidus may be due to

hypotensive effect of CO poisoning in the watershed territory of the arterial supply (Varon J et al.,1999, p.87, Anand R et al., 2006, p.95). The CO level for life threatening effect is 1200 ppm (%0.12). With laboratuary experiments, it is shown that if the patient stays in a medium with 50 ppm CO for thirty minutes she would have a carboxy-hemoglobin level of 3%. If she stays in a medium with 1000 ppm CO for a few hours she would have a carboxy-hemoglobin (COHb) level of %50. As seen the duration of exposure to CO containing medium is very important. To stay in a medium with high levels of CO for a short period can cause very high COHb levels. The initial findings for CO poisoning starts at a level of %15. The toxic level is %20-50, and the fatal level is over %50-60 (Mehta SR et al., 2007,p.362, Johnson CD, 2005, p.315). In conclusion, MRI is superior to CT in diagnosing the hypoxic changes. Also MRI is useful to determine overdose and prognosis.

Figures

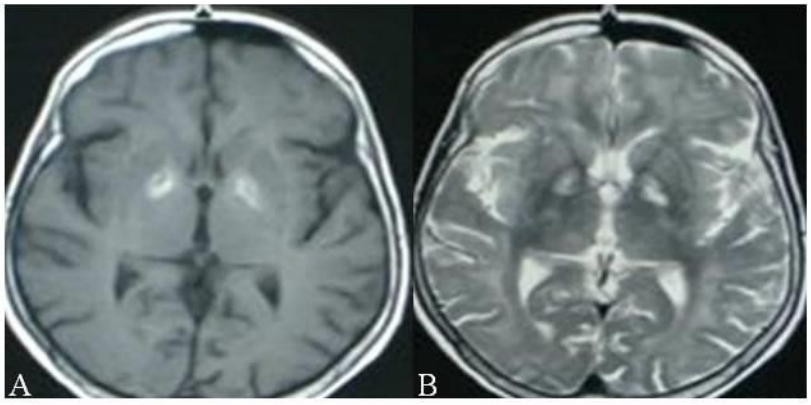

Figure 1A: T1-weighted axial image shows bilateral hyperintensity on both globus pallidus.

Figure 1B: T2-weighted axial image of the same patient with bilateral hyperintensity on both globus pallidus.

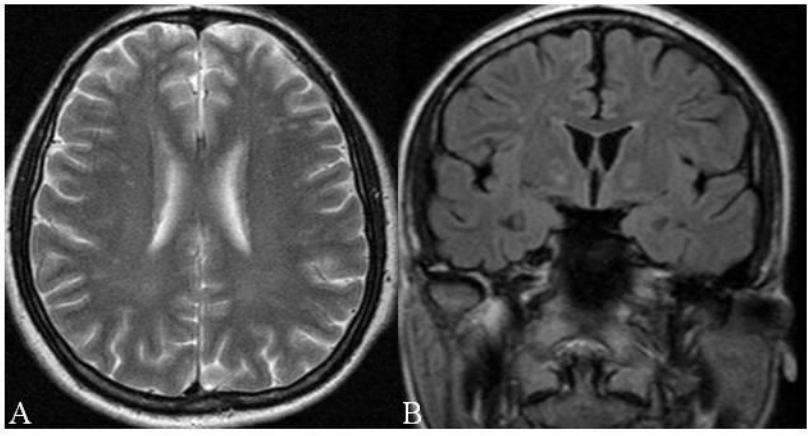

Figure 2A: T2-weighted axial image shows milimetric sized hyperintense lesions on the white matter.

Figure 2B: Coronal FLAIR images of the same patient shows hyperintense lesions on both globus pallidus.

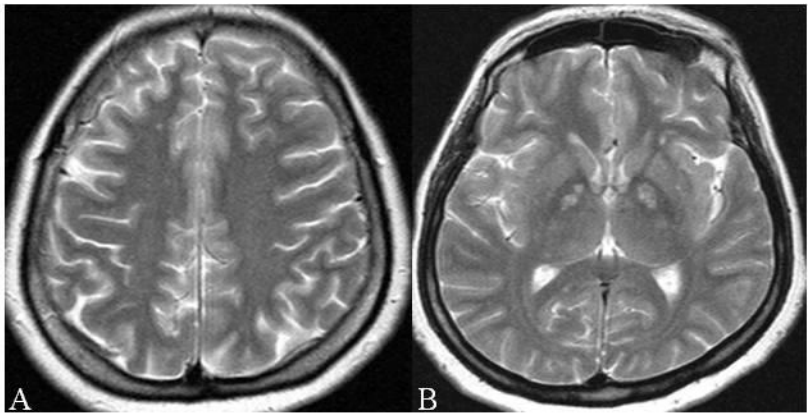

Figure 3A: T2-weighted axial image shows milimetric sized hyperintense lesions on the white matter.

Figure 3B: T2-weighted axial image of the same patient with bilateral hyperintensity on both globus pallidus.

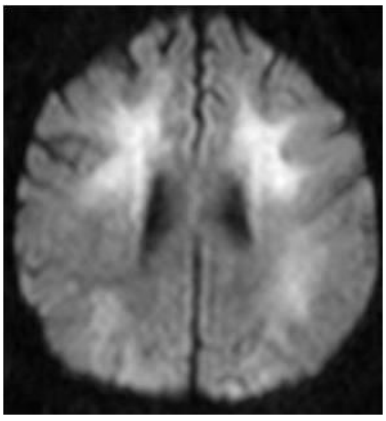

Figure 4: Diffusion weighted image shows bilateral, symmetric hyperintencity on the frontal and parietooccipital white matter.

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