Case Report

Cortical blindness induced by hepatic encephalopathy: case report and review of published case reports

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Case: Cortical blindness induced by hepatic encephalopathy is an extremely rare complication and its epidemiology has not been studied in great detail. We report a 63-year-old man with liver cirrhosis who developed sudden bilateral visual impairment.

Outcome: On arrival at hospital, the patient had orientation disturbance, slurred speech, and mild disturbance of consciousness with impaired vision (light sense). He had no focal neurological deficits except for bilateral blindness. Cerebral stroke was suspected, but imaging and ophthalmological examination did not reveal major abnormalities. An increased concentration of ammonia in blood suggested hepatic encephalopathy; a diagnosis of cortical blindness was proposed. His vision returned gradually with relief of hepatic encephalopathy.

Conclusion: Cortical blindness can be an initial symptom of hepatic encephalopathy without severe disturbance of consciousness, and can be misdiagnosed as cerebral stroke. Cortical blindness induced by hepatic encephalopathy has been reported in only 10 cases, including our patient, and merits further evaluation.

Key words: Cerebral stroke, cortical blindness, disturbance of consciousness, hepatic encephalopathy

INTRODUCTION

"HEPATIC ENCEPHALOPATHY" (HE) describes a spectrum of potentially reversible neuropsychiatric abnormalities seen in patients with liver dysfunction and/or portosystemic shunting. Signs and symptoms vary, but usually include disturbed consciousness, personality changes, intellectual deterioration, speech disturbance, asterixis, and sleep disturbance.[1] Hepatic encephalopathy is relatively easy to diagnose in patients with such symptoms, but may be more difficult to detect in patients having mild signs of altered brain function. Cortical blindness (CB) is an extremely rare feature of HE and its epidemiology has not been studied in great detail. Herein, we describe CB in a patient suffering from HE and discuss his condition in the context of previously published reports.

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CASE

A 63-YEAR-OLD MAN with liver cirrhosis noticed visual impairment when he arose from slumber, and was brought to our hospital with suspected stroke. He was in his usual state of health until 2 h before hospital admission. He had undergone blood transfusion in his younger days and had a 10-year history of liver cirrhosis (Child–Pugh B classification) with infection by hepatitis C virus but no history of HE.

At presentation, oxygen saturation was 95% in ambient air with a respiratory rate of 18 breaths/min. Blood pressure was 115/59 mmHg with a heart rate of 106 b.p.m. He had orientation disturbance and slurred speech, and the consciousness level on the Glasgow Coma Scale was 14 (E4V4M6). Pupils were round and isocoria with normal right reflex. He opened his eyes and focused on an object but could not see anything except for light at 0.5 m, which suggested that he had only a light sense. He had no focal neurological deficits except for bilateral blindness with the examination of neurologist, and his National Institute of Health Stroke Scale score was only three points (complete loss of

Table 1. Laboratory findings on admission of a 63-year-old man with cortical blindness induced by hepatic encephalopathy

Hematology			Biochemistry			Serology	
WBC	13,410	/μL	TP	5.4	g/dL	TPLA	(–)
Neu	11,800	/μL	Alb	2.5	g/dL	RPR	(–)
Ly	670	/μL	BUN	19.2	mg/dL	HBsAg	(–)
Mo	940	/μL	Cr	0.63	mg/dL	HCVAb	(+)
RBC	299×10^4	/μL	Na	145	mEq/L		
MCV	90.0	fL	K	3.6	mEq/L	Urinalyses	
Hb	8.5	g/dL	Cl	114	mEq/L	Gravity	1.015
Ht	26.9	%	Ca	8.2	mg/dL	pH	7.0
Plt	30.0×10^4	/μL	P	3.0	mg/dL	WBC	(–)
			AST	35	IU/L	Protein	(3+)
Coagulation			ALT	19	IU/L	Sugar	(–)
APTT	25.4	s	LDH	375	IU/L	Ketones	(–)
PT	13.3	s	ALP	506	IU/L	Blood	(+)
PT-%	82.3	%	T-Bil	0.8	mg/dL		
PT-INR	1.11		BS	113	mg/dL		
Fibrinogen	352	mg/dL	CPK	285	IU/L		
D-dimer	11.92	μg/mL	AMY	71	IU/L		
			NH3	121	mmol/mL		
			CRP	0.97	mg/dL		

Alb, albumin; ALP, alkaline phosphatase; AMY, amylase; APTT, activated partial thromboplastin time; ALT, alanine aminotransferase; AST, aspartate transaminase; BS, blood sugar; BUN, blood urea nitrogen; Ca, calcium; Cl, chloride; CPK, creatine phosphokinase; Cr, creatinine; CRP, C-reactive protein; Hb, hemoglobin; HBsAg, hepatitis B surface antigen; HCVAb, hepatitis C antibody; Ht, hematocrit; K, potassium; LDH, lactate dehydrogenase; Ly, lymphocytes; MCV, mean corpuscular volume; Mo, monocytes; Na, sodium; Neu, neutrophils; NH3, ammonia; P, phosphorus; Plt, platelets; PT, prothrombin time; PT-INR, prothrombin time – international normalized ratio; RBC, red blood cells; RPR, rapid plasma reagin; T-Bil, total bilirubin; TP, total protein; TPLA, treponema pallidum latex agglutination; WBC, white blood cells.

visual field). Body temperature was 37.4°C and a flapping tremor was present. Hypoglycemic attack was excluded by rapid inspection. Computed tomography excluded cerebral hemorrhage. Although fluid-attenuated inversion recovery (FLAIR) magnetic resonance imaging (MRI) indicated mild chronic ischemic lesion, diffusion-weighted MRI of the brain and MR angiography did not show any abnormalities. Taking imaging findings into consideration, a stroke was unlikely. Ophthalmological examination was unremarkable. Laboratory investigations (ammonia concentration in blood = 121 mmol/L [normal value, <39 mmol/mL]) (Table 1) and orientation disturbance with a flapping tremor suggested grade 2 HE. Although we could not carry out an electroencephalogram or visually evoked potential, a diagnosis of CB was proposed. Supplements of branched-chain amino acids and lactulose were given. Vision returned gradually with relief of HE (Table 2). The patient was discharged 3 days after hospital admission without complications.

Table 2. Clinical course of a 63-year-old man with cortical blindness induced by hepatic encephalopathy

Day	Time	Visual activity	Grade of hepatic encephalopathy	Ammonia level, mmol/mL
1	21:30	Light sense	II	121
2	07:00	Hand motion	II	
	12:00	Finger motion	I or none	57
	18:00	Almost normal	None	49
3	07:00	Normal	None	37

Table 3. Summary of all published case reports of cortical blindness (CB) due to hepatic encephalopathy (HE)

Case	Authors	Age (sex)	Underlying disease	HE grade	Ammonia† (normal range)	Severity of visual loss	Other symptoms except for typical findings of HE	Duration of severe visual loss	Findings on brain MRI	Other remarks	Outcome
1	Naparstek *et al.*[5]	43 (M)	LC (unknown)	II–III	48 μg/dL (N.A.)	Total	Headache, muscle twitching	Several hours	N.A.	N.S.	Recovery
2	Miyata *et al.*[4]	48 (M)	LC (unknown)	II–III	280 μg/mL (30–130)	Total	N.S.	3 weeks	N.A.	CB with HE occurred six times in 1 year	Recovery
3	Chen *et al.*[6]	50 (M)	LC (hepatitis B)	II–III	420 μg/mL (<170)	Total	Gastrointestinal bleeding	<24 h	N.A.	N.S.	Recovery
4	Canbakan *et al.*[7]	43 (M)	LC (hepatitis B)	II	‡	‡	‡	‡	‡	‡	Recovery
5	Ammer *et al.*[2]	19 (M)	FH (drugs§)	N.A.	N.A.¶	Total	Gastrointestinal bleeding	N.A.	Within normal limits	CB developed after liver transplantation	No recovery††
6	Dunser *et al.*[8]	49 (F)	LC (unspecified viral hepatitis)	N.A.	N.A.	N.A.	Diarrhea	1 week	N.A.	N.S.	Partial recovery
7	van Pesch *et al.*[3]	55 (M)	End-stage liver disease (hepatitis B)	I–II	96 mg/dL (<125)	Total	Occipital headache, seizure	2 weeks	Recurrent occipitoparietal lesion coinciding with CB	Focal occipital status epilepticus on EEG with appearance of CB, treated with AEs	Partial recovery
8	Eguchi *et al.*[9]	49 (M)	LC (hepatitis C)	II	136 μg/dL (N.A.)	Hand motion	N.S.	12 h	Within normal limits	N.S.	Recovery
9	Arikan *et al.*[10]	5 (M)	FH (unknown)	III–IV	296 mg/dL (<80)	Hand motion	N.S.	3 weeks	Occipito-parietal lesion	Awakened with persistent CB after liver transplantation	Recovery
10	Our patient	63 (M)	LC (hepatitis C)	II	121 mmol/mL (7–39)	Light sense	N.S.	18 h	Within normal limits	N.S.	Recovery

†Unit and normal range varies in each reference. ‡Detail is unclear as this reference is not written in English. §Paracetamol and 3,4-methylenedioxymethamphetamine ("ecstasy"). ¶Not measured at onset of visual loss; ††Reviewed for 1 year. AEs, antiepileptics; EEG, electroencephalography; F, female; FH, fulminant hepatitis; LC, liver cirrhosis; M, male; MRI, magnetic resonance imaging; N.A., not available; N.S., not significant.

DISCUSSION

IN HE, METABOLIC disturbance can lead to various symptoms, such as personality changes, disturbances in sleep rhythms, stroke simulation, periodic alternating gaze deviation, and CB.[2] The latter refers to visual loss in the presence of normal pupillary light reflexes and normal fundi caused by bilateral lesions of visual pathways in temporal–occipital lobes.[2] In addition, the occipital cortex displays elective sensitivity to various metabolic insults.[3] Therefore, in rare cases of HE, the visual cortex may be affected and CB may occur. Cortical blindness may also occur before loss of consciousness.[2,4] Hence, the fact that HE is not usually considered in a patient without a history of HE is noteworthy.

The most common cause of CB is cerebral vascular disease.[2] For example, CB can result in patients with obstruction of bilateral posterior cerebral arteries. In the era of tissue plasminogen activator, prompt detection of ischemic stroke has become increasingly important. To take advantage of tissue plasminogen activator, prompt and precise evaluation of neurological symptoms must be undertaken in all cases of acute cerebral infarctions. However, too much emphasis on an early diagnosis of stroke can lead to a delay in the diagnosis of other diseases. Cortical blindness related to HE can mimic the features of cerebral vascular disease (e.g., onset of confusion and disorientation, and sometimes neurological deficits). We should carefully investigate the physical findings, radiological studies, and history (especially past history and past head MRI) to differentiate stroke from HE. In addition, in CB patients with stroke (Anton's syndrome[2]) the fact that they usually deny visual loss is interesting.

Only nine case reports of CB related to HE have been published.[2–10] Characteristics of patients diagnosed with CB related to HE are summarized in Table 3. Similar to our patient, reports have shown that CB related to HE tends to occur in middle-aged males (all but one patient was a male), visual loss is preceded by typical symptoms of HE, vision loss is synchronized with HE exacerbation, and visual impairment is severe (but usually reverts to normal after recovery from HE within several days). However, vision does not always return completely, so careful monitoring is required. Miyata *et al.*[4] and van Pesch *et al.*[3] reported a case of recurrent HE accompanied by transient CB. Some predisposing factors in the host may be important. The ammonia level in blood is usually above average, and the diagnosis is dependent on symptoms. In some cases, occipitoparietal lesions are detectable using MRI, and carrying out MRI is worthwhile to exclude stroke and posterior leukoencephalopathy. Hepatic insufficiency by itself is rarely associated with seizures. The patient reported by van Pesch *et al.*[3] differs from other reports in that CB resulted from focal occipital status epilepticus with ictal discharges on electroencephalography and MRI abnormalities. Cortical blindness with HE after fulminant hepatitis has been reported and, in such cases, CB may remain after liver transplantation.

CONCLUSION

WE REPORTED A rare manifestation of HE resulting in CB and reviewed previously published reports. Early detection and therapy for HE may lead to a good outcome. We should carefully differentiate stroke from HE. Cortical blindness induced by hepatic encephalopathy, reported in only 10 cases including our patient, merits further evaluation.

CONFLICT OF INTEREST

NONE.

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