

• Case report •

Case report of mental disorder induced by niacin deficiency

Wei WANG*, Bo LIANG

Summary: The 45-year-old male patient described in this case report had a classic case of pellagra. The patient was initially brought to a psychiatric hospital because of disorderly behavior. On admission the patient was unable to provide a history so he was given a provisional diagnosis of Psychosis Not Otherwise Specified. Despite having the cardinal symptoms of dermatitis, dementia and (three days after admission) diarrhea it took 20 days to confirm the diagnosis of pellagra. After initiation of appropriate treatment it took about six months for the patient to make a complete recovery.

1. Case description

1.1 Status on admission

A 45-year-old male was admitted in April 2011 after being found lying naked in the street talking to himself and cursing passers-by. He was unable to provide his name or home address so no information was available on his history.

On admission his vital signs were normal (temperature 36.5 °C; pulse, 80 bpm; respiratory rate, 20 times/minute; and blood pressure, 125/80 mmHg) and he had normal muscle strength and reflexes. There were no abnormalities in electrolytes, blood counts, blood glucose, lipid profile, or liver or kidney function tests. Urine and stool tests were normal. EKG, EEG and ultrasound of the liver, kidneys, pancreas and spleen found no abnormalities. The sole abnormality on physical examination was that the skin around his eyes and forehead were dark brown to black and his hands and forearms were covered with flaking skin (see Figure 1).

Mental status examination on admission found that the patient was conscious but unable to answer questions correctly. He covered his head with a quilt during the examination for no obvious reason. He laughed to himself, manifested inappropriate emotions and appeared to lack insight into his condition. He had difficulty concentrating, had slowed reactions, and got a score of 20 on the Mini-Mental Status Exam (MMSE)—indicating moderate cognitive impairment.

1.2 Initial treatment

Given an admission diagnosis of Psychosis Not Otherwise Specified (NOS), the patient was started on perphenazine 2mg/day. After three days of treatment, he developed severe diarrhea (yellow stool 3 to 4 times a day) and vomiting without an associated fever, with no abnormalities in the stool, and with a normal erythrocyte sedimentation rate. The diarrhea was not due to a gastrointestinal infection, so to stop the diarrhea he was prescribed 5 mg of diphenoxylate, one bag of diosmectite, and 2 capsules of compounded glutamine three times a day. To resolve electrolyte imbalances (K, 2.8mmol/L), he was also given a daily intravenous infusion of 500 ml of 5% glucose and sodium chloride, with 30ml of 10% potassium chloride, 1.0 gram of vitamin C, and 1.0 gram of vitamin B6.

Despite these treatments his diarrhea persisted. By the 15th day of admission the patient started having fecal incontinence. His level of consciousness deteriorated, he manifested signs of intense fear, stopped answering questions and was no longer able to feed himself. His temperature was 36.8 °C; pulse, 75 bpm; respiratory rate, 19 times/minute; and blood pressure, 90/60 mmHg. He had marked increased muscle tone.

1.3 Diagnosis of pellagra established

Perphenazine was stopped immediately and (20 days after the initial admission) he was temporarily transferred to the gastroenterology department of another (general) hospital. A 24-hour urine test found

Figure 1. Dermatological damage at admission**Figure 2. Present photo of the same hand**

decreased levels of N-methylnicotinamide (<0.5 mg) and a CT of the brain identified abnormalities of the cerebral cortex and diffuse spots around the cerebral ventricles. Together with the clinical symptoms, a diagnosis of niacin deficiency (i.e., pellagra) was made.

1.4 Protracted recovery

The patient subsequently returned to the psychiatric hospital and was treated with high-dose niacin acid, vitamins B and C, and glutamin. Thirty-five days after the initial admission his cognitive functioning improved, he could speak with a weak voice, the skin color of his face and forearms lightened, the peeling of his skin lessened, and his muscle strength improved. Ten days later (45 days after admission) he was able to answer questions but he started to have paranoid hallucinations (about someone trying to kill him with a knife) and he stopped complying with his treatment so he was restarted on perphenazine 2mg/ day. One month later (75 days after admission) he was able to communicate normally, was no longer paranoid or delusional, the scaling skin had completely fallen away from the patient's face and hands (as shown in Figure 2), his skin color had returned to normal and his muscular power had improved so he was able to use a wheelchair on his own.

1.5 History of development of pellagra in the patient

Six months after admission the patient had fully recovered and his family members (from another province) came and took him home. Based on the retrospective reports of the patient, his family members, and his colleagues, he had come to Xinjiang to work

as a construction worker about 8 months before his admission. About 5 months prior to admission his skin started to show changes. And about a month prior to admission he strolled off the construction site and was not found after an extensive search by his coworkers. The patient had no memory of the events that occurred between the time he left the construction site until he was admitted to the hospital. There was no history of alcohol abuse and no family history of mental illness.

2. Discussion

2.1 Pellagra

This is a classic case of a mental disorder induced by niacin deficiency (pellagra). Diarrhea, dermatitis, and dementia are three cardinal symptoms of niacin deficiency. Other common neuropsychiatric symptoms include peripheral neuropathy, decreased muscle strength, depression, and hallucinations and delusions. Nicotinic acid is synthesized from the amino acid tryptophan, so niacin deficiency can directly influence the synthesis of respiratory enzymes and indirectly influence the synthesis of serotonin. The latter changes can cause dysfunctional neural transmission and, thus, give rise to neurological and psychiatric symptoms.^[1,2]

In the past, pellagra was relatively common in China and was endemic in communities where the diet relied on corn and sorghum with few supplementary food items.^[1] The incidence of pellagra from dietary deficiency has decreased dramatically as China's economy has improved but individual cases still occur. In high-income countries niacin deficiency is usually associated with

alcohol abuse; with increasing rates of alcohol abuse in China the cases of pellagra related to chronic alcohol use are also increasing.^[3-5]

2.2 Identification and treatment of pellagra

It is uncommon for patients to simultaneously present with all of the three cardinal symptoms so they may seek treatment in different medical departments.^[6] Patients may go to gastroenterology departments for diarrhea, to dermatology departments for desquamation, or to neurology or psychiatry departments for neuropsychiatric symptoms.^[4] The patient described in this case report was admitted to a psychiatric hospital because his neuropsychiatric symptoms were most prominent at the time he was identified and brought in by the police.

An immigrant worker living in poor conditions, his pellagra started with dermatological symptoms but he did not seek treatment. He subsequently developed cognitive symptoms and wandered away from his worksite. After living in the streets for about a month – which probably exacerbated his dietary deficiency – his unusual behavior (being naked, talking to himself, and swearing at passers-by) brought him to the attention of the police.

Despite the presence of dermatitis and dementia on admission and the subsequent appearance of diarrhea three days after admission it took 20 days until the diagnosis of pellagra was made. After the diagnosis was made and the proper treatment initiated, the physical and neuropsychiatric symptoms resolved gradually over several months. Ten days after starting treatment for pellagra the patient had paranoid hallucinations and delusions that required short-term treatment with low-dose antipsychotic medication. These psychotic symptoms may have been previously obscured by his dementia and decreased level of consciousness, only to emerge after the dementia lifted.

2.3 Lessons learned

We believe there are several factors that lead to the delay in arriving at the correct diagnosis: a) the patient's cognitive state made it impossible to obtain an adequate

history; b) inpatient psychiatrists' lack of sufficient training about and experience with physical causes of psychiatric symptoms; c) limited exchange between specialty psychiatric hospitals and general medical hospitals; and d) lack of the sophisticated laboratory equipment needed to diagnose uncommon medical disorders at psychiatric hospitals.

This case highlights several important lessons. Psychiatrists, particularly those who work in specialty psychiatric hospitals, need better training in the wide range of medical conditions that can present as neuropsychiatric disorders. They also need to remain vigilant because it is easy to overlook such patients in the course of their daily work of treating large numbers of patients with neuropsychiatric disorders that are not caused by physical illnesses. The long-standing separation of psychiatric and nonpsychiatric medical services in China has several negative consequences; administrative efforts are needed to break down the barriers that limit exchange between psychiatric hospitals and general hospitals.

Acknowledgment

The patient provided written informed consent to publish this case history including the photograph of his hand and forearm.

References

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Dr. Wei Wang graduated from the Xinjiang Shihezi Medical College in 2004. She is currently an attending psychiatrist and Ward Chief at the An Ning Hospital in Urumuqi, Xinjiang. Her research interests are the prognosis and comprehensive treatment of schizophrenia.