



## Case Report

# Wernicke-Korsakoff syndrome in a patient with chronic alcoholism: A case report

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## Abstract

Thiamine (Vitamin B1) is a cofactor for several key enzymes essential for energy metabolism. Wernicke-Korsakoff syndrome (WKS) is a rare but reversible neurodegenerative disease that occurs due to severe lack of thiamine. The common cause of thiamine deficiency is alcoholism. WKS may present with confusion, ataxia, hallucination, amnesia and altered vision. Brain requires continuous supply of thiamine for metabolic and synthetic purposes. Brain damage arises due to the concomitant effect of thiamine deficiency and alcohol abuse. Wernicke-Korsakoff syndrome can be treated by administering intravenous thiamine up to 1g in the first 24 hours, by maintaining a balanced diet rich in vitamin B1 and also by proper hydration and support to stop drinking alcohol. In this, we report a case of male patient admitted in neurology department with history of chronic alcohol abuse and complaints of loose stools, slurring of speech, dysarthria, altered sensorium and double vision. Evaluation showed fatty liver infiltration in addition to the Wernicke-Korsakoff syndrome. Neuroimaging, metabolic workup were performed and thiamine was administered in therapeutic doses with significant clinical improvement. He was discharged with oral thiamine in a functionally independent state with resolution of symptoms.

**Keywords:** Wernicke's encephalopathy, Korsakoff's syndrome, ataxia, amnesia.

## Introduction

Wernicke-Korsakoff Syndrome (WKS) is potentially the gravest consequence that happens due to severe thiamine (vitamin B1) deficiency. In late nineteenth century, two researchers independently defined Wernicke's encephalopathy (WE) and Korsakoff syndrome (KS) and due to its shared characteristics, it was finally termed as Wernicke-Korsakoff syndrome<sup>1,2</sup>.

Thiamine deficiency can occur due to the inadequate dietary intake, decreased conversion to its active coenzyme, reduced hepatic storage of the vitamin in patients with fatty metamorphosis and impaired thiamine absorption inhibition of intestinal thiamine transport due to ethanol. Thiamine has a normal role in producing the required energy for brain through the processing of sugar by the body. Due to the deficiency of thiamine, there is an inadequate supply of energy to brain that leads to gradual damage to brain and nervous system. Crucial role of magnesium in the catalytic action of thiamine pyrophosphokinase, which converts thiamine to its active thiamine pyrophosphate by transferring a pyrophosphate group from adenosine triphosphate to thiamine. Chronic alcohol ingestion and severe loose motion can lead to magnesium depletion<sup>3</sup>.

Initially a patient can be affected with Wernicke's encephalopathy alone and if it is left undiagnosed or untreated, can proceed to Korsakoff's syndrome. The symptoms of WE

occur rapidly and require immediate medical attention whereas KS tend to appear gradually. WE can develop even due to gastrointestinal conditions, after chemotherapy, renal diseases, AIDS and thyrotoxicosis regardless of alcohol intake<sup>4,5</sup>.

The prevalence of WKS across the world is between 0% and 2%<sup>6</sup>. This syndrome usually presents with a clinical manifestations consisting of altered mental status (i.e., confusion or dementia), nystagmus (or ophthalmoplegia), and ataxia.

## Case Report

A fifty nine year old male patient admitted on April 2017 with Wernicke- Korsakoff syndrome. He experienced dysarthria and abnormal posturing of right hand. He was admitted in the hospital due to severe loose stools since 10 days, altered sensorium and double vision. He had a history of ataxia since afternoon and excessive anger. The patient was found to be weak and came in a wheelchair due to instability in walking. He had a 32 year history of regular alcohol consumption and heavy smoking.

He had a previous history of ischemic heart disease (evolved cardiogenic shock), coronary artery disease (mainly triple vessel disease), type II diabetes mellitus and ultra sound of abdomen and pelvis showed grade I fatty infiltration of liver.

Percutaneous transluminal coronary angioplasty (PTCA) was done and stenting provided to left anterior descending artery (LAD), twelve days before admission with the presenting symptoms.

Laboratory investigation showed raised HbA1c (11.6%), erythrocyte sedimentation rate (48mm/hr), troponin T level (652.6pg/ml) and creatine kinase-MB (CKMB-6.9ng/ml). There were no significant alterations in laboratory workup including complete blood count, kidney function tests, electrolytes, serologic tests and liver function tests. Upon admission, patient was administered with injection thiamine, 500mg in 100ml normal saline over 20 minutes at the interval of twelve hours and injection nurokind plus twice daily, that can correct the vitamin deficiency, enterogermina oral suspension twice daily for the present complaint of loose stool. Other drugs corresponding to the past medical history were also provided. Brain magnetic resonance imaging (MRI) ruled out acute infarct (Figure-1). Examination on the next day showed normal extra ocular movement, tandem gait performable with difficulty and also electroencephalogram interpreted normal in wakefulness.

Patient was advised to take tablet nurokind next, twice daily, oral thiamine 500mg twice daily for the initial three days and switched to 100mg thrice daily and was asked to continue the same along with past medications. He had no significant mental symptoms apart a slight difficulty in tandem walk and was discharged seven days after his hospitalization.

### Discussion

WKS is a medical emergency<sup>3</sup>. Patients with nutritional deficiencies are at risk for WKS. Traditionally this disorder is associated with alcoholism, but along with unbalanced nutrition for two to three weeks can also lead to thiamine depletion and eventually brain lesions. People with ages 45-65 years and men a little more often than women are affected with WKS<sup>7</sup>. Certain non-alcoholic conditions related with WKS are hyperemesis gravidarum, anorexia nervosa, refeeding after starvation, thyrotoxicosis, malabsorption syndrome, hemodialysis, AIDS, malignancy, gastroplysis with postoperative vomiting<sup>3,8</sup>.

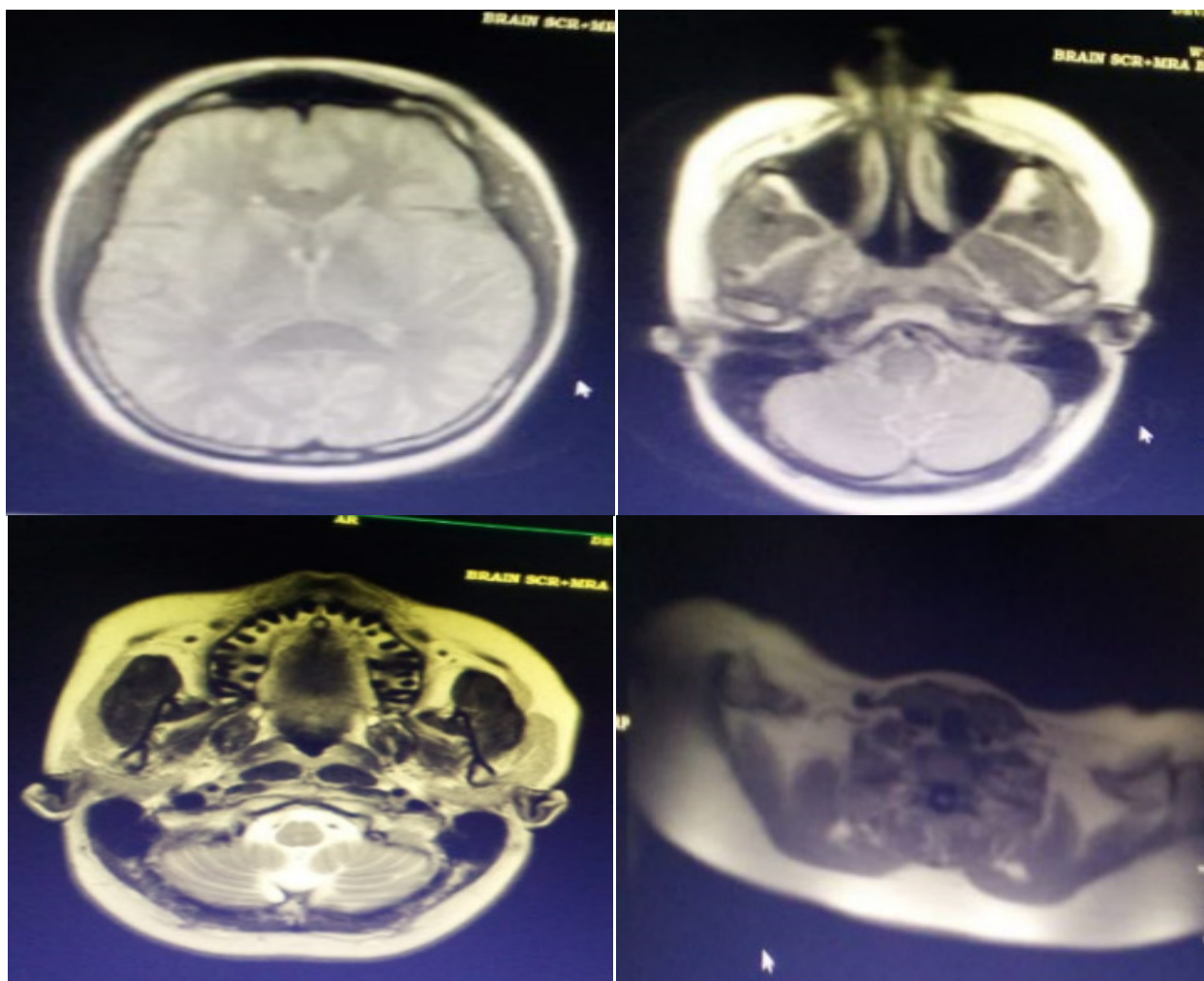


Figure-1: Magnetic resonance imaging of brain showed no acute infarct.

WE can be assessed by the measurement of erythrocytes containing thiamine pyrophosphate and erythrocyte transketolase activity assay<sup>3</sup>. Here, the patient undergo self-imposed long lasting nutritional encephalopathy adjunct to alcohol misuse. Parenteral thiamine should be administered all of a sudden to prevent irreversible brain damage in case of Wernicke's encephalopathy and also in order to avoid the progression to Korsakoff's syndrome and mortality<sup>3,9</sup>. The daily thiamine requirement is as small as 1-2mg, but to pass the blood – brain barrier and central nervous system, administration with 500-1500mg is recommended<sup>10</sup>. Magnetic resonance imaging (MRI) is the most powerful method for confirming WKS. MRI result will provide the best visualization and neurological quantification of Wernicke-Korsakoff syndrome<sup>11</sup>. About 25% of the cases miss the diagnosis of WKS if brain examination is not done properly<sup>12</sup>.

This case describes the clinical suspicion that arised as a result of the presence of the symptomatic triad of WKS. Chronic alcoholism diminishes the amount of thiamine transported across the intestinal mucosa and impede its chemical conversion.

Due to the presentation of severe symptoms, patient was admitted immediately in the hospital and provided thiamine. According to our observation, thiamine level should be tested before prescribing with parenteral or oral thiamine. Vitamin B1 deficiency can lead to eternal cognitive and physical disabilities that necessitate lifelong intake of thiamine drug<sup>13</sup>. It can be treated by administering intravenous (IV) thiamine up to 1 g in the first 24 hours<sup>14</sup>. It is important to maintain adequate fluid and electrolyte balance to avoid dehydration. Ensure normal serum magnesium level because low level of magnesium had implicated in thiamine deficiency associated with WKS<sup>10</sup>.

## Conclusion

WKS is a reversible, treatable and highly underdiagnosed syndrome with greatest mortality rates. Rapid diagnosis of the disease with timely interventions and higher effective thiamine doses provides better outcomes. This case report highlights the concomitant occurrence of co-morbidity between dietary disorders and substance abuse disorders. Vitamin B1 supplements in combination with proper nutrition can reduce the risk of progression to WKS.

**Ethical approval:** Patient was informed about publishing the case report.

## Abbreviations

WKS - Wernicke-Korsakoff Syndrome; WE – Wernicke's Encephalopathy, KS – Korsakoff 's Syndrome; AIDS – Acquired Immune Deficiency Syndrome; PTCA - Percutaneous Transluminal Coronary Angioplasty; LAD - Left Anterior Descending artery; CK-MB - Creatine Kinase-MB; MRI - Magnetic Resonance Imaging.

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