Wernicke's encephalopathy in a patient with severe acute pancreatitis after cholecystectomy and exploration of biliary tract

Huihui Du
Second Xiangya Hospital
Xiaohua Lei
Second Xiangya Hospital
Qiang Liu
Second Xiangya Hospital
Xundi Xu (xuxundi@csu.edu.cn)
Second Xiangya Hospital https://orcid.org/0000-0003-3686-2975

Case report

Keywords: Wernicke's encephalopathy (WE), thiamine, severe acute pancreatitis (SAP), cholecystectomy, exploratory biliary tract surgery

Posted Date: April 9th, 2019

DOI: https://doi.org/10.21203/rs.2.45/v2

Abstract

Background Wernicke's encephalopathy (WE) is a disease classically associated with thiamine deficiency,and generally presents with the triad of opthalmopathy, ataxia and altered mentality. However, and delayed diagnosis and treatment may lead to severe irreversible neurological damage, or even death. Only about 20% of the cases can be defined from the relevant literature, with the rest unnoticed and thus unreported. Here, we would like to report a case of a patient with severe acute pancreatitis who suffered from Wernicke's encephalopathy after cholecystectomy and exploratory of biliary tract. Case presentation A 37-year-old Chinese male patient diagnosed with severe acute pancreatitis was admitted to our institute's hospital for further treatment. The patient had a 50-days history of abdominal pain as well as 8-days emesis, and wasn't addicted in alcohol consumption. He did not receive any regular physical examination or treatment. One months before cholecystectomy and exploratory of biliary tract,he was noted to have abdominal pain, poor appetite, emesis and sclera icterus .He was referred to the local hospital, received supportive treatment, including antibiotics and liver-protection drugs . However, he got worse after those treatment,so transferred from the local hospital to our hospital for further therapy.. After operationhe was admitted in general ward for further treatment. When his vital signs and laboratory examination came to stability. He recovered well with supportive treatments, including antibiotics, liver-protection, protecting gastric mucosa and so on. However,his oral intake was low, and he was solely dependent on total parenteral nutrition without vitamin B1. On the 7th post-operative day, psychiatric and neurological disorders appeared without an obvious cause, symptoms including babbling, irritability, apathy, non-purposeful movements, and dystaxia. On the basic of his clinical manifestations and brain magnetic resonance imaging scan results, Wernicke encephalopathy was eventully diagnosed. Conclusions Although extremely rare, this index patient highlights that Wernicke's encephalopathy could be associated with severe acute pancreatitis. This is very helpful for the therapeutic implications and evaluating curative effect. A multivitamin and thiamine should be provided for patients who have a surgery of cholecystectomy and exploratory of biliary tract so as to prevent and cure Wernicke's encephalopathy.

Background

Wernicke's encephalopathy (WE) is a neuropsychiatric syndrome resulting from thiamine (vitamin B1) deficiency that occurs frequently in patients with prolonged parenteral nutrition and reduced oral intake[1].The development of WE after parenteral nutrition due to the lack of thiamine was first reported in 1975 by Blennow[2]. The classic triad of WE includes ophthalmopathy, ataxia and confusion, and delay in its diagnosis may result in severe irreversible neurological damage or even death. Approximately 20% of the cases can be defined from the relevant literature, with the rest unnoticed and thus unreported[3]. Although early diagnosis and treatment with thiamine can observably reverse the symptoms, the mortality rate of Wernicke's encephalopathy (WE) still remains 10–20% due to misdiagnosis[4].

Although it is most frequently seen due to chronic malnutrition associated with long-term alcohol use, it may occur in patients who suffer from severe acute pancreatitis and have a cholecystectomy and

exploratory biliary tract surgery.

Here, we present a non-alcoholic male patient with severe acute pancreatitis who developed Wernicke's encephalopathy after cholecystectomy and exploratory biliary tract surgery. This case emphasizes the need for early diagnosis and thiamine supplementation.

Case Presentation

A 37-year-old Chinese male patient diagnosed with severe acute pancreatitis was admitted to our institute's hospital for further treatment. The patient had a 25-day history of abdominal pain as well as an 8-day history of emesis, and he was not addicted to alcohol consumption. He did not receive any regular exams or treatments. One month before cholecystectomy and exploratory biliary tract surgery, he was observed to have abdominal pain, poor appetite, emesis and sclera icterus. He was referred to the local hospital, and his cardiovascular and neurological exams were normal. His vital signs were heart rate of 117 min-1, blood pressure 126/82 mmHg, temperature 38.2°C, and respiratory rate 29 min-1. Serum amylase was 723 IU/L (reference range: 25-125 IU/L) and lipase 554 IU/L (reference range: 23-300 IU/L). The diagnosis of severe acute pancreatitis was confirmed after an abdominal CT scan showed biliary sludge in the gallbladder and a large fluid collection around a severely inflamed pancreas. APACHE-II scores for the patient reached 13 points. Supportive treatment, including antibiotics, parenteral nutrition and liver-protection were performed. However, the patient's condition worsened, so the patient was transferred from the local hospital to our hospital for surgery. After surgery, he was admitted to the general ward for further treatment, where his vital signs and laboratory exams stabilized. He recovered well with supportive treatments, including antibiotics, liver-protection, and protection of the gastric mucosa. However, his oral intake was too low to support himself, and he was singly dependent on total parenteral nutrition without vitamin B1. On the 7th post-operative day, psychiatric and neurological disorders, including symptoms of babbling, irritability, apathy, non-purposeful movements, and dystaxia, appeared without an obvious cause. In addition, there were no obviously infectious signs. He had no history of chronic alcohol consumption, psychosis, diabetes mellitus, hypertensive disease, coronary artery disease, or tuberculosis. The laboratory evaluation yielded the following: white blood cell count, 12.6 ×109/L; neutrophil percentage, 87.20%; red blood cell count, 4.65 ×109/L; platelet count, 110 ×109/L; haemoglobin, 159 g/L; international normalized ratio, 1.74; blood ammonia, 29.2 μmol/L; serum alanine aminotransferase, 172.3 U/L; serum aspartate aminotransferase, 60.4 U/L; serum total protein, 84.7 g/L; serum albumin, 51.2 g/L; serum sodium, 133 mmol/L; and serum kalium, 4.0 mmol/L; serum calcium 2.75 mmol/L; serum thiamine B1, 26.5 nmol/L. Therefore, brain magnetic resonance imaging (MRI) was performed (Figure 1). On the basis of his clinical manifestations and brain magnetic resonance imaging scan results, Wernicke's encephalopathy was eventually diagnosed. After intravenous vitamin B1 prescribed, with 500 mg daily for the first 3 days and 100 mg daily for the second 3 days; all symptoms were apparently resolved and returned to normal in the next week[5]. Patient follow-up was initiated 3 months after the operation; an MRI showed no obvious abnormality in the lesion, and his symptoms returned to normal.

Discussion And Conclusion

It is well-known that the active form of thiamine pyrophosphate plays an important role in the pentose phosphate pathway and the tricarboxylic acid cycle, which are essential in the metabolism of carbohydrates and lipids. The active form of thiamine pyrophosphate also plays an important role in energy metabolism as a cofactor for enzymes such as transketolase, pyruvate dehydrogenase, and alpha ketoglutarate dehydrogenase. Lacking thiamine, the excessive metabolism of brain cells will suffer from cell energy deficit, acidosis and even cellular death[6]. Vitamin B1 deficiency can lead to WE because it disturbs glucose metabolism of the brain, which results in lactic acid accumulation and acidosis and hinders the production, release and reuptake of neurotransmitters. The consumption of vitamin B1 also increases with the supplementation of glucose[7]. Since the body's reserve of thiamine is exhausted after nearly 20 days of scant supplementation, thiamine deficiency may occur within as few as 18-20 days in patients receiving severe thiamine-free diets. In our case, the patient was given total parenteral nutrition and a large quantity of glucose to promote post-operative rehabilitation. Hypermetabolism, nutrition without vitamin B1 and the acceleration of vitamin B1 consumption by glucose eventually leads to WE.

Wernicke encephalopathy is a universally known neurological complication of thiamine deficiency that mostly occurs in alcoholic persons and is regarded as a rare complication of severe acute pancreatitis. The diagnostic criteria of WE proposed by the 2010 European Union of Neuroscience Association includes (1) dietary deficiencies; (2) ophthalmopathy; (3) cerebellar dysfunction; and (4) either an altered mental state or mild memory impairment. We can diagnose WE clinically when patients exhibit at least two of the four elements[7]. As it is presented, doctors will take WE into account when the patient presents with the classic triad of Wernicke's encephalopathy, including ophthalmopathy, ataxia and confusion. However, Wernicke's encephalopathy might be underdiagnosed and even misdiagnosed because there is often non-specific clinical presentation and because approximately 19% of patients have none of the symptoms of the specific triad[8]. There are few case reports in patients with Wernicke's encephalopathy who suffered from severe acute pancreatitis and received cholecystectomy and exploratory biliary tract surgery.

In our case report, the patient did not manifest the complete triad, and the most obvious symptoms and signs were mental status changes. The systematic clues to this disease are anorexia, confusion, blindness, amyasthexia, nystagmus, irritability and recurring vomiting episodes[9]. From the typical clinical manifestation, Wernicke's encephalopathy could be diagnosed[10]. The patient has a long history of dietary deficiency and showed mental status changes. Serum thiamine B1 was lower than normal, his brain MRI supported WE, and his condition recovered after vitamin supplementation. WE was eventually definitively diagnosed. The differential diagnosis between Wernicke's encephalopathy in a patient with severe acute pancreatitis after cholecystectomy and exploratory biliary tract surgery and other psychiatric and/or neurological disorders includes pancreatic encephalopathy, hepatic encephalopathy, septic encephalopathy, and cerebral vascular accidents. Pancreatic encephalopathy is a complication of severe acute pancreatitis that manifests as confusion, restlessness, and altered mentality, and there is evidence of diffuse demyelination and white matter changes in cerebral imaging[12]. Sometimes, it is difficult to

distinguish the difference between Wernicke's encephalopathy and other encephalopathies due to the overlap of neuropsychiatric manifestations and to the multiple concomitant clinical and metabolic alterations capable of explaining the neurologic alterations. Regarding these difficulties, some physicians who joined the discussion still insisted on their initial diagnosis of the other encephalopathies, and they did not give up their opinions until the condition of the patient was recovered by intravenous vitamin B1. Therefore, when difficulties in distinguishing between Wernicke's encephalopathy and other psychiatric and/or neurological disorders appear, intravenous vitamin B1 could be regarded as a discriminative method or a pre-emptive treatment.

According to some sensitive clinical signs related to a patient, combined with serum thiamine levels and brain images, WE would be more likely to be diagnosed[13]. The most valuable method used to diagnose Wernicke's encephalopathy is brain magnetic resonance imaging, with a high (93%) specificity. However, due to poor sensitivity (53%), it is not reliable enough for normal magnetic resonance imaging to exclude the disease[14]. The typical magnetic resonance imaging findings of WE include symmetrically increased T2 signals in the thalami, mammillary bodies, tectal plate, and periaqueductal grey matter. Other changes could also be seen in MRI, such as abnormal signal-intensity in the cerebellum, the cerebellar vermis, the cranial nerve nuclei, the dentate nuclei, the red nuclei, the caudate nuclei, the corpus callosum, and the cerebral cortex[15, 16].

Wernicke's encephalopathy can emerge in post-operative patients who have prolonged total parenteral nutrition without sufficient thiamine supplementation, which makes the addition of thiamine indispensable. It is reported that a delay in treatment with thiamine before the magnetic resonance imaging findings can lead to progressive and irreversible damage and even death. Thus, early parenteral supplementation with thiamine after cholecystectomy and exploratory biliary tract surgery can quickly reverse symptoms and prevent further injury[17].

In conclusion, human beings may develop Wernicke's encephalopathy at any age, and persons who suffers from severe acute pancreatitis after cholecystectomy and exploratory biliary tract surgery may be at higher risk. Wernicke's encephalopathy should be taken into consideration when patients with prolonged total parenteral nutrition present one or more symptoms of ophthalmopathy, ataxia and altered mentality. The most valuable examination for WE is brain magnetic resonance imaging. After cholecystectomy and exploratory biliary tract surgery, a multivitamin and thiamine regimen should be provided for patients to prevent and treat Wernicke's encephalopathy[7].

Abbreviations

WE: Wernicke's encephalopathy; MRI: magnetic resonance imaging; SAP: severe acute pancreatitis

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Signed informed consents were obtained from the patient for publication of this Case Report and any accompanying images. A copy of the consent form is available for review by the Editor of this journal.

Availability of data and material

All data generated during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This work was supported by the National Natural Science Foundation of China (No, 81670111). The funding paid staff costs for the design of the study, the collection and analysis of data, and writing the manuscript.

Authors' contributions

HHD contributed to the concept, drafting and reporting of the case. XHL and QL contributed to writing and revising the report. XDX contributed to the analysis and interpretation of the results and to revising the report. All authors read and approved the final manuscript. All authors read and approved the contents of the case report.

Acknowledgements

The authors thank the family and patient for their participation in this study.

References

1. Day, G.S. and C.M. del Campo, *Wernicke encephalopathy: a medical emergency.* Cmaj, 2014. **186**(8): p. E295.

2. Blennow, G., *Wernicke encephalopathy following prolonged artificial nutrition.* Am J Dis Child, 1975. **129**(12): p. 1456.

3. Azim, W. and R. Walker, *Wernicke's encephalopathy: a frequently missed problem.* Hosp Med, 2003. **64**(6): p. 326-7.

4. Sechi, G., *Thyrotoxicosis-associated Wernicke's encephalopathy.* J Gen Intern Med, 2008. **23**(6): p. 897.

5. Boulanger, A.S., et al., *[Wernicke encephalopathy: Guiding thiamine prescription].* Encephale, 2017. **43**(3): p. 259-267.

6. Thomson, A.D. and E.J. Marshall, *The natural history and pathophysiology of Wernicke's Encephalopathy and Korsakoff's Psychosis.* Alcohol Alcohol, 2006. **41**(2): p. 151-8.

7. Galvin, R., et al., *EFNS guidelines for diagnosis, therapy and prevention of Wernicke encephalopathy.* Eur J Neurol, 2010. **17**(12): p. 1408-18.

8. Sechi, G. and A. Serra, *Wernicke's encephalopathy: new clinical settings and recent advances in diagnosis and management.* Lancet Neurol, 2007. **6**(5): p. 442-55.

9. Sadighi, Z., et al., *Diagnostic Clues to Human Herpesvirus 6 Encephalitis and Wernicke Encephalopathy After Pediatric Hematopoietic Cell Transplantation.* J Child Neurol, 2015. **30**(10): p. 1307-14.

10. Weidauer, S., et al., *Wernicke encephalopathy: MR findings and clinical presentation.* Eur Radiol, 2003. **13**(5): p. 1001-9.

11. Sun, G.H., et al., *Pancreatic encephalopathy and Wernicke encephalopathy in association with acute pancreatitis: a clinical study.* World J Gastroenterol, 2006. **12**(26): p. 4224-7.

12. Zhang, X.P. and H. Tian, *Pathogenesis of pancreatic encephalopathy in severe acute pancreatitis.* Hepatobiliary Pancreat Dis Int, 2007. **6**(2): p. 134-40.

13. Kattah, J.C., *The Spectrum of Vestibular and Ocular Motor Abnormalities in Thiamine Deficiency.* Curr Neurol Neurosci Rep, 2017. **17**(5): p. 40.

14. Antunez, E., et al., *Usefulness of CT and MR imaging in the diagnosis of acute Wernicke's encephalopathy.* AJR Am J Roentgenol, 1998. **171**(4): p. 1131-7.

15. Nolli, M., et al., *Wernicke's encephalopathy in a malnourished surgical patient: clinical features and magnetic resonance imaging.* Acta Anaesthesiol Scand, 2005. **49**(10): p. 1566-70.

16. Manzo, G., et al., *MR imaging findings in alcoholic and nonalcoholic acute Wernicke's encephalopathy: a review.* Biomed Res Int, 2014. **2014**: p. 503596.

17. Latt, N. and G. Dore, *Thiamine in the treatment of Wernicke encephalopathy in patients with alcohol use disorders.* Intern Med J, 2014. **44**(9): p. 911-5.

Figures

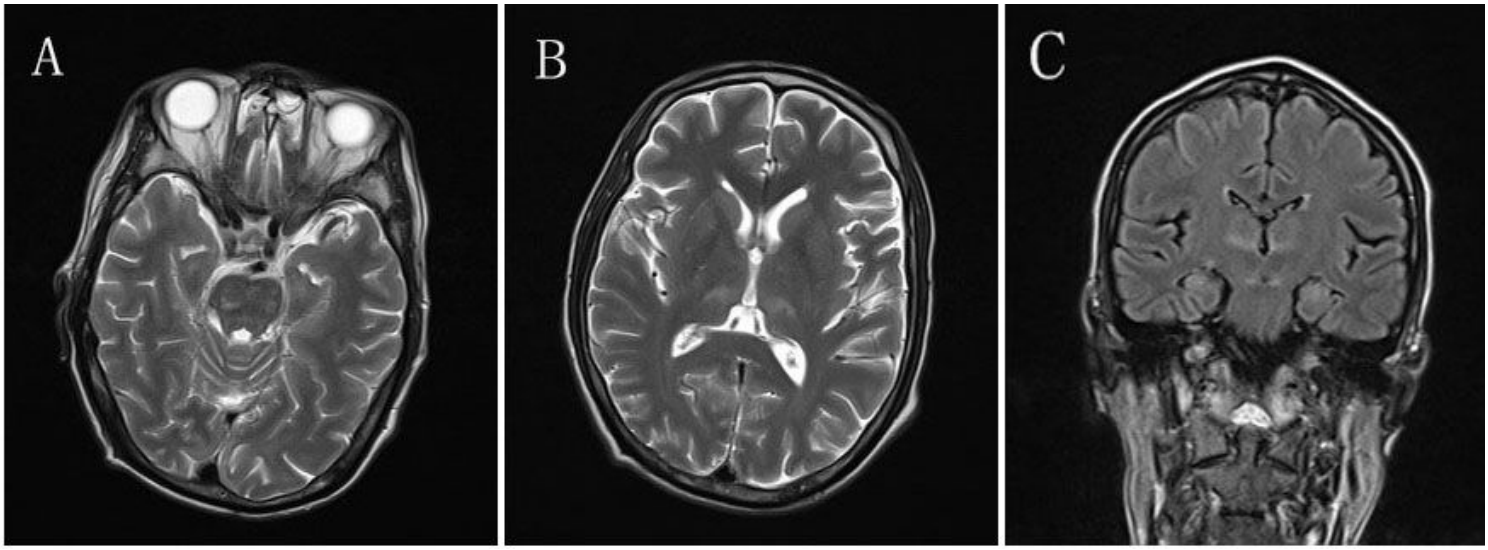

Figure 1

Brain magnetic resonance imaging demonstrating that there were symmetrically increased T2 signals in the medial parts of the thalamus, pons and paraventricular area. (A) There were symmetrical high T2 signals in the medial parts of the thalamus. (B) There were symmetrical high T2 signals in pons. (C) There were symmetrical high T2 signals in paraventricular area.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- supplement1.docx