

Case report of pyogenic meningitis after tooth extraction in an elderly diabetic patient

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Folia Neuropathol 2022; 60 (3): 362-364

DOI: <https://doi.org/10.5114/fn.2022.118792>

Abstract

Introduction: Among elderly diabetic patients with comorbid conditions, the clinical characteristics of suppurative meningitis may not be typical, which is easy to cause misdiagnosis and delayed treatment.

Case presentation: In this report, we described the case of a 65-year-old elderly diabetic male who developed purulent meningitis after tooth extraction. The patient developed repeated infections (fever, headache and other symptoms) and was diagnosed with pyogenic meningitis by combining clinical manifestations and cerebrospinal fluid testing. The patient was treated with intracranial pressure reduction, nutritional support and anti-infection drugs, and recovered and was discharged after 15 days.

Conclusions: The atypical clinical presentation and insidious onset of the disease in this patient could easily lead to missed diagnosis and misdiagnosis. We emphasize that we should be vigilant with purulent meningitis and active treatment and prevention should be implemented in this subgroup of patients. During treatment, active anti-infection and nutritional support should be provided on the basis of blood glucose control.

Key words: senile diabetes mellitus, tooth extraction, purulent meningitis.

Introduction

Purulent meningitis is common in children, the elderly and immunosuppressed people. Its clinical manifestations are fever, headache, vomiting and meningeal irritation, which can be diagnosed in combination with a lumbar puncture. In purulent cerebrospinal fluid, leukocyte count is increased significantly (characterized by increased polymorphonuclear cells), protein content is increased and sugar and chlorine content is decreased [2,5]. When the patient's autoimmune system is low, oral infection occurs and invasive tooth extraction is carried out. Clinically, we can take measures such as controlling blood glucose, maintaining local oral health, standard use of antibiotics and other measures to prevent further development of infection [1].

In this study, after tooth extraction, the patient had gingival infection, recurrent headache and elevated

body temperature. Early computed tomography (CT) and magnetic resonance imaging (MRI) showed no obvious abnormalities. Combined with cerebrospinal fluid examination, purulent meningitis can be finally diagnosed. Combined with age, history of diabetes, poor blood glucose control, and acute tooth extraction, pyogenic meningitis was finally developed. Purulent meningitis in diabetic patients is often an occult disease, and the symptoms are not typical [4]. The special case reported in this study provides guidance to help early detection of purulent meningitis in diabetic patients.

Case presentation

On 15 May, a 65-year-old male patient was admitted to the hospital with headache for 26 days and fever for 10 days after tooth extraction. On 28 April 2020, the patient went to the dental clinic with unbearable

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swelling and pain of the left gum, and was diagnosed with left dental caries and was treated with tooth extraction. Since 29 April, the patient had had paroxysmal distending pain in the forehead, accompanied by nausea and vomiting 3 times, which was gastric contents and non-ejection. There was no impairment of limb movement and no change in consciousness. After taking cefixime 0.1 g, bid for 3 days, no obvious improvement was noted. On 2 May, the patient went to the local hospital, and no significant abnormality was found in the head CT, sputum smear showed candida albicans growth, oral fungal infection was considered, and fluconazole and gastrodin injection were given for 7 days, but the condition was not improved. On 9 May, the patient's body temperature increased to 38.3°C, and he went to see a doctor again. Oral infection was considered. The patient was treated with cefazolin sodium intravenously and Fenbid orally for 5 days. The symptoms of fever and headache were improved. On 15 May, the patient developed headache and fever again, which was worse than before. Combined with laboratory examination and chest CT scan results, the results of type 2 diabetes with ketosis and oral infection after tooth extraction.

Medical history of the patient: in March 2015, the patient was diagnosed with type 2 diabetes mellitus. The patient was given lifestyle intervention, acarbose orally and premixed insulin subcutaneously to control blood glucose, and reported that the blood glucose control was stable, and denied tingling of hands and feet, blurred vision and foamy urine. In February 2019, the patient did not monitor blood glucose during COVID-19 epidemic and took medication irregularly. The patient denied history of hypertension and other chronic non-communicable diseases.

Physical examination: The examination results showed no obvious abnormality.

After admission:

1. Blood routine tests: leukocytes $19.08 \times 10^9/l$ ↑; neutrophil ratio 92.7% ↑; neutrophils $17.68 \times 10^9/l$ ↑; lymphocyte ratio 3.4% ↑; lymphocytes $0.65 \times 10^9/l$ ↑; erythrocytes $3.3 \times 10^{12}/l$ ↑; haemoglobin 98 g/l ↑; erythrocyte pressure volume 29.1% ↓; mean red blood cell volume 88 fl; platelets $385 \times 10^9/l$ ↑; C-reactive protein 207.87 mg/l ↑; haematocrit 140 mm/1 h ↑;
2. Liver function and kidney function: normal;
3. Fasting glucose 12.5 mmol/l ↑; urinary routine: urine sugar +++ urine ketone ++; B-hydroxybutyric acid 1.2 mmol/l;
4. Blood electrolytes: potassium 3.6 mmol/l; sodium 124 mmol/l ↓; chloride 87 mmol/l ↓; calcium 2.12 mmol/l ↓; phosphorus 0.4 mmol/l ↓; magnesium 0.8 mmol/l; lactate dehydrogenase 225 U/l; carbon dioxide binding 26 mmol/l; cholinesterase 4061 U/l ↓;

5. Serum: fasting insulin: 1.8 UIU/ml ↓; fasting C-peptide: 0.1 ng/ml ↓;

Preliminary diagnosis after admission: 1. Fever: oral infection? Other? 2. Type 2 diabetes; diabetic ketosis.

After correction of diabetic ketosis, the intensive insulin subcutaneous injection was changed to control blood glucose, and blood glucose control was possible and electrolytes returned to normal. After intravenous administration of ceftizoxime for 2 days, the headache and fever of the patient were not significantly relieved. Then, cerebrospinal fluid examination was performed, and the results showed: suppuration; cloudy; no blood and coagulation. Multiple cerebrospinal fluid bacterial cultures were negative. Negative for Candida; negative for Cryptococcus antigens; negative for antacid staining.

The patient was diagnosed with pyogenic meningitis by combining clinical manifestations and cerebrospinal fluid testing, and was treated with mannitol to lower cranial pressure, dexamethasone to prevent adhesions, meropenem and ornidazole empirically for anti-infection and nutritional support. On 30 May, the patient's headache and fever symptoms were completely relieved, and all indexes of cerebrospinal fluid were normal before discharge. The patient was followed up until November 2020 after discharge, there was no recurrence.

Discussion and Conclusions

The atypical clinical presentation and insidious onset of the disease in this patient could easily lead to missed diagnosis and misdiagnosis. The clinical manifestations of meningitis in elderly patients can be insidious compared to younger patients [3]. Self-administration of cefixime after the onset of headache and fever in this patient resulted in partial relief of both headache and fever, and irregular antibiotic use can also make the clinical manifestations atypical. Coupled with the atypical pathological changes of pyogenic meningitis in the early stage, no significant abnormalities were seen in CT/MRI of the head, and the diagnostic value of imaging is limited, which can also increase the difficulty of diagnosis. This requires clinicians to be alert to meningitis and to judge and analyse it in the context of the patient's specific clinical presentation, and eventually to perform lumbar puncture combined with cerebrospinal fluid examination to confirm the diagnosis. The patient's multiple negative blood and cerebrospinal fluid cultures are presumably related to the patient's prior antibiotic use and the choice of the culture medium used.

Once pyogenic meningitis is diagnosed, it should be treated aggressively against infection, and effective anti-infection treatment is strongly associated with prognostic outcome [6]. In combination with this patient's oral infection [5], we used meropenem and ornidazole in combination. The preferred route of drug

administration is intravenous. If blood and cerebrospinal fluid culture results are available, a more precise anti-infective treatment regimen can be adjusted based on the pathogenesis. It is important to note that as the patient's symptoms improve with the use of effective antibiotics, it is not recommended to lower the drug dose at this time. Because the permeability of the blood-brain barrier to drugs also tends to decrease as meningeal inflammation resolves, adequate doses and courses of anti-infective drugs are emphasized [7].

This patient had hyponatremia on admission, which may be associated with a combination of multiple factors; pseudohyponatremia due to hyperglycaemia, inadequate intake due to poor feeding of the patient and inappropriate secretion of antidiuretic hormone associated with septic meningitis may be involved and needs to be combined with the patient's synchronous water intake and output, urine specific gravity and urine electrolytes, and blood pressure. In this patient, we gradually controlled the blood glucose in a reasonable range with insulin, provided nutritional support, and actively fought against infection, and then the patient's blood sodium gradually returned to normal levels.

The atypical clinical presentation and insidious onset of the disease in this patient could easily lead to missed diagnosis and misdiagnosis. We emphasize that we should be vigilant with purulent meningitis and active treatment and prevention should be implemented in this subgroup of patients. During treatment, active anti-infection and nutritional support should be provided on the basis of blood glucose control.

Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki and approved by the ethics committee of our hospital.

Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Disclosure

The authors report no conflict of interest.

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