CASE REPORT

Delayed diagnosis of odontogenic infection: a lesson from altered mental status and abnormal breathing

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Abstract

Altered mental status is a common, yet challenging, clinical presentation encountered by physicians. Here, we report a case of a 68-year-old Japanese female who was transferred to the emergency department due to faint. The laboratory results showed hyponatremia, ketonuria, hyperglycemia and acute kidney injury without fever or inflammatory findings. Although these abnormalities were corrected, her mental status was exacerbated, and apnea/tachypnea appeared. She was eventually diagnosed with acute apical abscess and recovered immediately after dental extractions. This case suggests that odontogenic infection should be considered in the differential diagnosis of altered mental status and that interdisciplinary dental management, including surgical treatment, should be considered for patients with predisposing factors.

INTRODUCTION

Altered mental status (AMS) is a common, yet challenging, clinical presentation encountered by physicians [1, 2]. It is a non-specific term used to describe an entire spectrum of brain dysfunctions and is broadly defined as a change in loss of consciousness and cognitive function. Approximately 4–10% of all the patients in the emergency department (ED) have AMS [1]. Given the large population of patients presenting to the ED, it is crucial to assess and diagnose patients with AMS.

Odontogenic infections generally remain localized and heal without complications if appropriate therapy is administered and physiologic immunocompetence is present [3–5]. However, under certain conditions, odontogenic infections can spread and cause systemic inflammatory reactions [3–5]. Apical abscess is the most common form of dental abscess and is caused by infection of the root canal of the tooth. The reasons why dental root canal infections can become symptomatic and evolve to severe spreading and sometimes life-threatening abscesses remain elusive [5].

Here, we report a case of a 68-year-old Japanese female with AMS and without fever on admission. She suffered from hyponatremia, ketonuria, hyperglycemia and acute kidney injury, all of which may cause AMS. However, the cause of her AMS turned out to be acute apical abscess, and her AMS immediately improved after dental extractions.

CASE REPORT

A 68-year-old Japanese female was transferred to the ED by ambulance because she had fainted after dizziness. Her past medical history was hypertension, diabetes mellitus and chronic kidney disease, and she was on multiple medications.
She had been anorexic for ~1 month. She was an ex-smoker and a social drinker.

On admission, her mental status was recovered and her conscious levels were E4V5M6 (Glasgow Coma Scale (GCS)). Her physical findings and vital signs were as follows: height 139.0 cm, body weight 52.3 kg, body mass index 27.1 kg/m², blood pressure 128/75 mmHg, heart rate 152 beats/min with irregularity, body temperature 36.8°C, oxygen saturation on room air 98% and respiratory rate 18 breaths/min. Her physical examinations, which included her conjunctiva, cervical lymph nodes, chest, heart and abdomen, revealed normal findings.

Baseline laboratory results were as follows: white blood cell count (WBC) 10 300/μL, hemoglobin 12.8 g/dL, blood urea nitrogen 34 mg/dL↑, creatinine 4.09 mg/dL↑, sodium 128 mEq/L↓, potassium 2.6 mEq/L↓, chlorides 87 mEq/L↓, total protein 7.1 g/dL↓, albumin 4.2 g/dL↓, C-reactive protein (CRP) 0.07 mg/dL↓, glucose 262 mg/dL↑ and β-glycated hemoglobin 5.9%. Urinalysis revealed protein (1+), sugar (4+) and ketones (+) with no blood cells or casts. Electrocardiogram revealed atrial fibrillation, but there were no abnormal findings on chest radiograph or on brain or thoracoabdominal computed tomography (CT).

These findings suggested that her AMS might be caused by one or more conditions, namely, hyponatremia, ketonuria, hyperglycemia and acute kidney injury (uremia), which were presumably due to dehydration, diabetic ketoacidosis and chronic kidney disease. She was hospitalized and treated with electrolytes, including sodium chloride and potassium chloride, and insulin.

Although her blood electrolytes, serum glucose and renal function gradually improved, general conditions, including her consciousness, deteriorated. On the third day after hospitalization, her cognitive function became impaired with reduced conscious levels to E4V3M4 (GCS). Abnormal breaths with apnea and tachypnea accompanied by a fever (37.8°C) appeared, and glossoptosis was found (Fig. 1). Both an oropharyngeal airway and bite block were placed in order to maintain her airway, which is we realized that she suffered from multiple, painful dental caries, but no findings of within the oropharynx.

Laboratory results on the hospital Day 3 were as follows: WBC 14 800/μL with 94.1% neutrophils↑ and CRP 0.08 mg/dL↓. There were no abnormal findings on chest radiograph, brain or thoracoabdominal CT, brain magnetic resonance imaging, or spinal fluid examination.

Because no abnormalities were detected in the central nervous system, empiric treatment was initiated with 2.25 g q6hr of piperacillin/tazobactam for fever of unknown origin presumably caused by bacterial infection(s).

On hospital Day 6, a dentist examined her teeth and found 15 dental caries, then dental extractions were performed on four teeth. In particular, pus was discharged from the left upper canine with gingival swelling, which was diagnosed with acute apical abscess.

On hospital Day 7, her mental status was completely normal (Fig. 1), indicating that apical abscess was acute, severe inflammation of the dental pulp with minimal chance of spontaneous recovery [3–5] and may have caused her AMS and abnormal breathing. Although two sets of blood cultures sampled on hospital Day 3 were negative, bacterial culture from the dental pus sampled on hospital Day 6 yielded methicillin-sensitive Staphylococcus aureus. Antibiotic treatment was de-escalated to 1 g q8hr of cefazolin on hospital Day 13 and was completed on hospital Day 20. The patient fully recovered and was discharged on hospital Day 23.

**DISCUSSION**

Due to the contribution of modern diagnostics and therapy in dentistry, severe complications after odontogenic infections, such as fasciitis, mediastinitis, sepsis and multiple organ failure, have a small incidence rate. However, patients with predisposing factors, such as diabetes mellitus, obesity and immunosuppression, are more likely to have severe complications after odontogenic infections [3–5]. Long-term alcohol and nicotine abuse and inadequate oral hygiene are also associated with severe complications after odontogenic infections [3–5]. Since the case presented here had diabetes mellitus, chronic kidney disease, abnormal electrolytes and poor dental hygiene, and the patient’s AMS resolved immediately after dental extractions, we concluded that her AMS was caused by apical abscess. Further, surgical treatment was crucial for the therapeutic success of her apical abscess.

In the literature, it is extremely rare to have symptomatic hematogenous spread of bacteria in clinically inapparent dentoalveolar infections [5, 6]. Only one case has been reported with sepsis secondary to an occult dentoalveolar abscess in a pediatric patient [6]. This report is particularly important that odontogenic infections can be causative even without a clear focus of infection [6], which is similar to our case, although our case was not confirmed to be septic due to negative of two sets of blood cultures.

Since many factors can cause AMS, physicians need to maintain a wide differential and a thorough work-up is required [1, 2]. We have particularly learned the importance of re-evaluation and re-examination of the patient to maintain a consistent diagnosis, since we had initially suspected endocrine and renal dysfunction, which later turned out to be apical abscess. It is feasible that dental caries originally caused pulpal infection, which developed from apical periodontitis to apical abscess.

In conclusion, odontogenic infections, including apical abscess, should be considered in the differential diagnosis of AMS if bacterial infections may cause AMS. Further, appropriate interdisciplinary management should be considered as early as possible if predisposing factors are present in patients affected by odontogenic infections.
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The authors have no conflicts of interest to declare.

ETHICAL APPROVAL
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CONSENT
Patient permission was obtained prior to writing this report.

GUARANTOR
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