An Autopsy Case of Sudden Death Due To Adrenal Crisis Caused By Pulmonary Tuberculosis Complicated With Adrenal Tuberculosis

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Case report

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Abstract

Background: Adrenal tuberculosis is difficult to diagnose due to non-specific symptom. Sudden death due to adrenal crisis after trauma surgery is rare to be seen.

Case presentation: A 45-year-old man, who was admitted to hospital because of trauma of right hand, died suddenly on the 13th day after replantation of amputated fingers. He was diagnosed with brain edema and diluted hyponatremia. Autopsy and histopathologic examination revealed severe brain edema combined with cerebellar tonsillar hernia, extensive destruction of adrenal gland caused by bilateral adrenal tuberculosis and right lung invasive pulmonary tuberculosis.

Conclusions: Trauma and pulmonary tuberculosis complicated with adrenal tuberculosis induced the adrenal crisis, which eventually lead to severe cerebral edema and hernia, and finally death from respiratory and circulatory failure. This autopsy and histopathologic examination suggested a possible pathophysiologic mechanism of sudden death due to diluted hyponatremia after trauma surgery.

Introduction

Adrenal insufficiency continues to present a challenge for patients, their physicians and researchers[1]. Tuberculosis was the most common cause of adrenal insufficiency in the developing countries[2]. It was reported that the adrenal gland was the only extra-pulmonary organ involved by tuberculosis in 14 of these 55 patients (25%;35 men and 20 women)[3]. Adrenal tuberculosis is difficult to diagnose due to non-specific symptoms[4]. The diagnosis is therefore often delayed. The fact that adrenal insufficiency may result not only in poor general condition of the patient but also sudden death due to adrenal crisis, makes it all the more important to address this issue seriously[5]. Evidence on clinical presentation and evaluation of patients with adrenal insufficiency caused by bilateral adrenal tuberculosis is scarce.

Here, we report an unusual case of a patient admitted to hospital because of trauma without obvious clinical symptoms and signs of tuberculosis and adrenal insufficiency who died suddenly on the 13th day after finger replantation. This autopsy and histopathologic examination suggested a possible pathophysiologic mechanism of sudden death due to adrenal crisis caused by tuberculosis and trauma infection.

Case Presentation

A 45-year-old man, who was urgently admitted to hospital due to bleeding and dysfunction of right hand caused by trauma of the 2nd to 4th fingers. He had an unremarkable medical history and was treated by finger replantation after admission. However, on the 13th day after replantation, the patient fell down after vomiting. Head computed tomography (CT)-scan showed cerebral edema and laboratory examination detected an electrolyte disturbance (Table 1). He was diagnosed with brain edema, diluted hyponatremia and bacterial infection. After seizure, respiratory and cardiac arrest suddenly occurred.

Although an aggressive resuscitation attempt was made, he was pronounced dead. To investigate the cause of death, a pathologic autopsy was performed 48 hours later.

Table 1
Laboratory values

Laboratory test	Value	Reference range
pH	7.087	7.350–7.450
Sodium	108.2 mmol/L	136.0–145.0 mmol/L
Calcium	1.030 mmol/L	1.150–1.330 mmol/L
Lactic acid	9.1 mmol/L	0.6–1.4 mmol/L
Chlorine	78.7 mmol/L	98.0-107.0 mmol/L
C reactive protein	15.03 mg/L	0.00–10.00 mg/L
Procalcitonin	0.73 ng/L	0.04–0.50 ng/L
Cortisol	< 1.00 ug/dL	5.00–25.00 ug/dL
Adrenocorticotropic hormone	855.00 pg/mL	0.00–46.00 pg/mL

At autopsy, the patient was emaciated with dark skin. The right hand was swollen with surgical suture and kirschner wire in the 2nd to 4th fingers; no obvious purulent was present; no injuries and surgical incisions in other parts of the body.

There was congestion and swelling in pulmonary; calcification foci (the range is about 1.5⊆1⊆1cm) can be found in the lower lobe of right lung. Pleural thickening of both lungs was observed. Pulmonary hilar lymph nodes were enlargement. Microscopic examination of lung showed caseous necrosis with calcification and granuloma formation in the lower lobe of right lung, pleural fibrous tissue hyperplasia of bilateral lung and granulomatous inflammation of hilar lymph nodes (Fig. 1).

The left adrenal gland was 3⊆2⊆1.5cm in size and 13.0 g in weight, shown in irregular nodular shape with caseous necrosis. There was no obvious right adrenal gland. Microscopic examination showed caseous necrosis with calcification in the left adrenal gland, anti-acid staining was positive; granulomatous lesions can be observed in the right adrenal area, and a little caseous necrosis can be seen in the center. (Fig. 2)

The brain was 19⊆15⊆6cm in size and the cerebellum was 10⊆8⊆4 cm in size. The brain and cerebellum were 1446.5 g. Vasodilation and congestion can be observed on the surface of meningeal; cerebral gyrus was wide and cerebral sulcus was narrow; there was no subarachnoid hemorrhage; both sides of the brain were symmetrical, without bleeding on the section; There weir obvious indentation on the right cerebellar tonsils; no bleeding was found in cerebellar section. Microscopic examination showed dilation and hyperemia of the blood vessel in subarachnoid, and the perivascular lymphatic space in the

brain parenchyma was significantly widened. The nerve fibers were sparse, and the neuron cells degenerated, showing obvious brain edema changes. (Fig. 2E)

There were no remarkable abnormalities in heart, liver, kidney, spleen and gastrointestinal tract.

Discussion

We report a patient with tuberculosis-induced adrenal insufficiency, who presented with abnormal electrolytes, but without typical hyperpigmentation and abnormal glucose levels or hypotension so that it was ignored by the patient himself. The patient denied medical history when he was brought to hospital because of trauma.

Except for salt craving, the symptoms of primary adrenal insufficiency are rather nonspecific and include weakness, fatigue, musculoskeletal pain, weight loss, abdominal pain, depression and anxiety[4]. As a result, the diagnosis is frequently delayed, resulting in a clinical presentation with an acute life-threatening adrenal crisis[6]. Majority cases of adrenal insufficiency in the developed countries are attributed to autoimmune adrenalitis in contrast to the developing countries where tuberculosis is implicated to be the most common cause of adrenal insufficiency[5, 7].In 2019, tuberculosis remained the most common cause of death from a single infectious pathogen[8].In China, although the incidence of tuberculosis has decreased in recent years, the country still shares a significant part of the global burden of tuberculosis cases (8.4 %)[8].People living in rural areas, those who were less educated showed a low level of awareness of key knowledge about tuberculosis, leading to a delay in seeking care[9]. Adrenal insufficiency which may be caused by adrenal tuberculosis is a severe and potentially life-threatening condition related to the central role of glucocorticoids and/or mineralocorticoids in energy, salt, and fluid homeostasis[10].Laboratory value of the patient in this case showed significant reduction of cortisol and incredible increase of adrenocorticotropic hormone.

We concluded that trauma and pulmonary tuberculosis complicated with adrenal tuberculosis induced the adrenal crisis, which eventually lead to severe cerebral edema and hernia, and finally death from respiratory and circulatory failure. This autopsy and histopathologic examination suggested a possible pathophysiologic mechanism of sudden death due to diluted hyponatremia after trauma surgery.

Abbreviations

CT: Computed tomography; H&E: Hematoxylin and Eosin.

Declarations

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Authors’ contributions

Baocun Sun,Nan Zhao,Yutong Gao, Chunsheng Ni,Danfang Zhang Yanlei Li and Xiulan Zhao were responsible for performing the autopsy. Nan Zhao was responsible for the literature search and manuscript preparation. Baocun Sun, Nan Zhao and Yutong Gao, reviewed the microscopy.All authors have read and approved the final manuscript.

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Ethics approval and consent to participate

Written informed consent was obtained from all participants. Ethical approval was obtained from the Ethical Committee of Tianjin medical university. At the time of death, consent for the autopsy and informed consent was obtained from the family.

Consent for publication

Not applicable.

Availability of data and material

All data generated or analysed during this study are included in this published article.

Competing interests

The authors declare that there are no competing interests.

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Figures

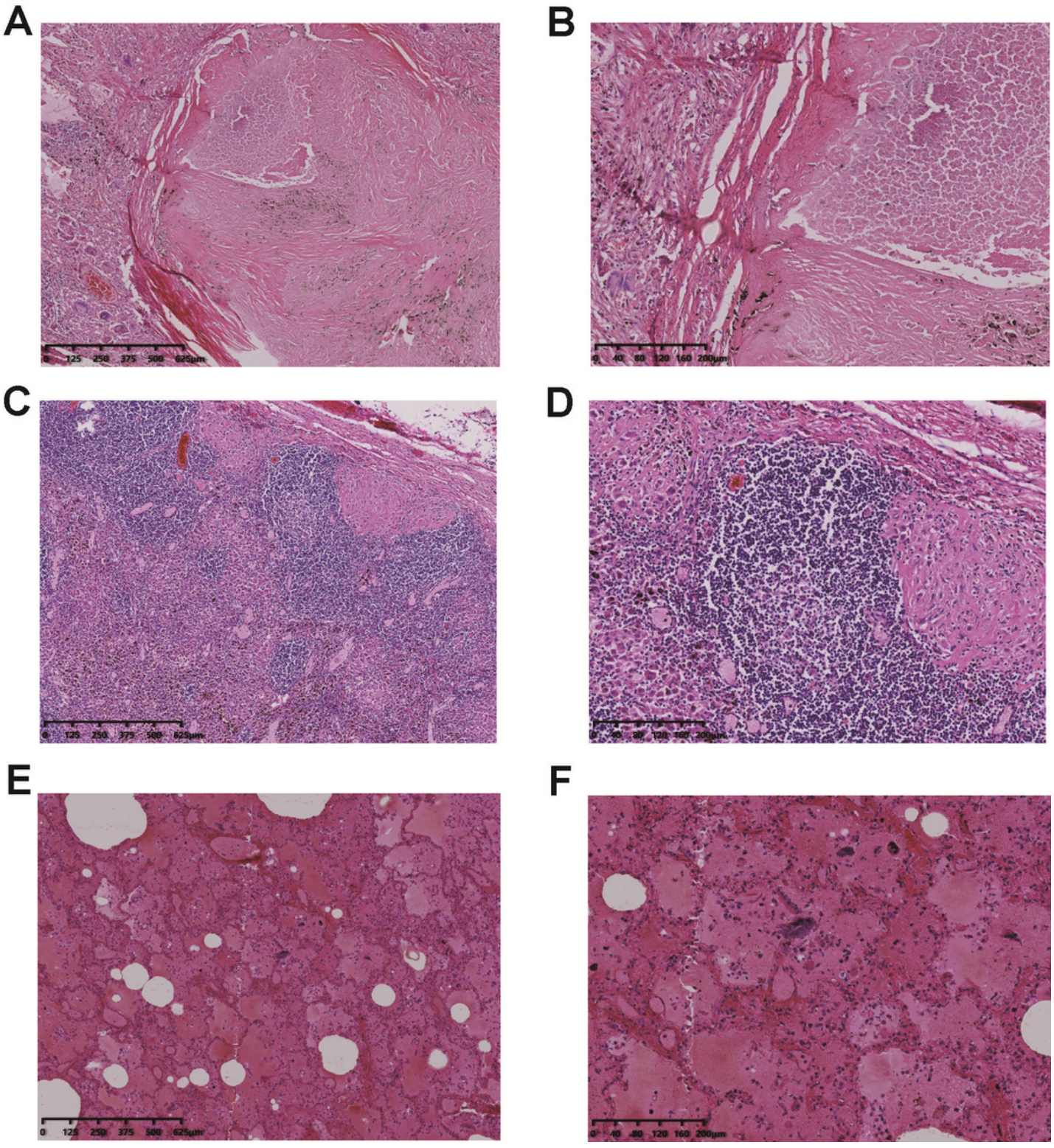

Figure 1

A (HE 4×) and B (HE 10×) Tuberculosis of right lung. C (HE 4×) and D (HE 10×) Tuberculosis of pulmonary hilar lymph node. E (HE 4×) and F (HE 10×) Congestion and swelling in pulmonary.

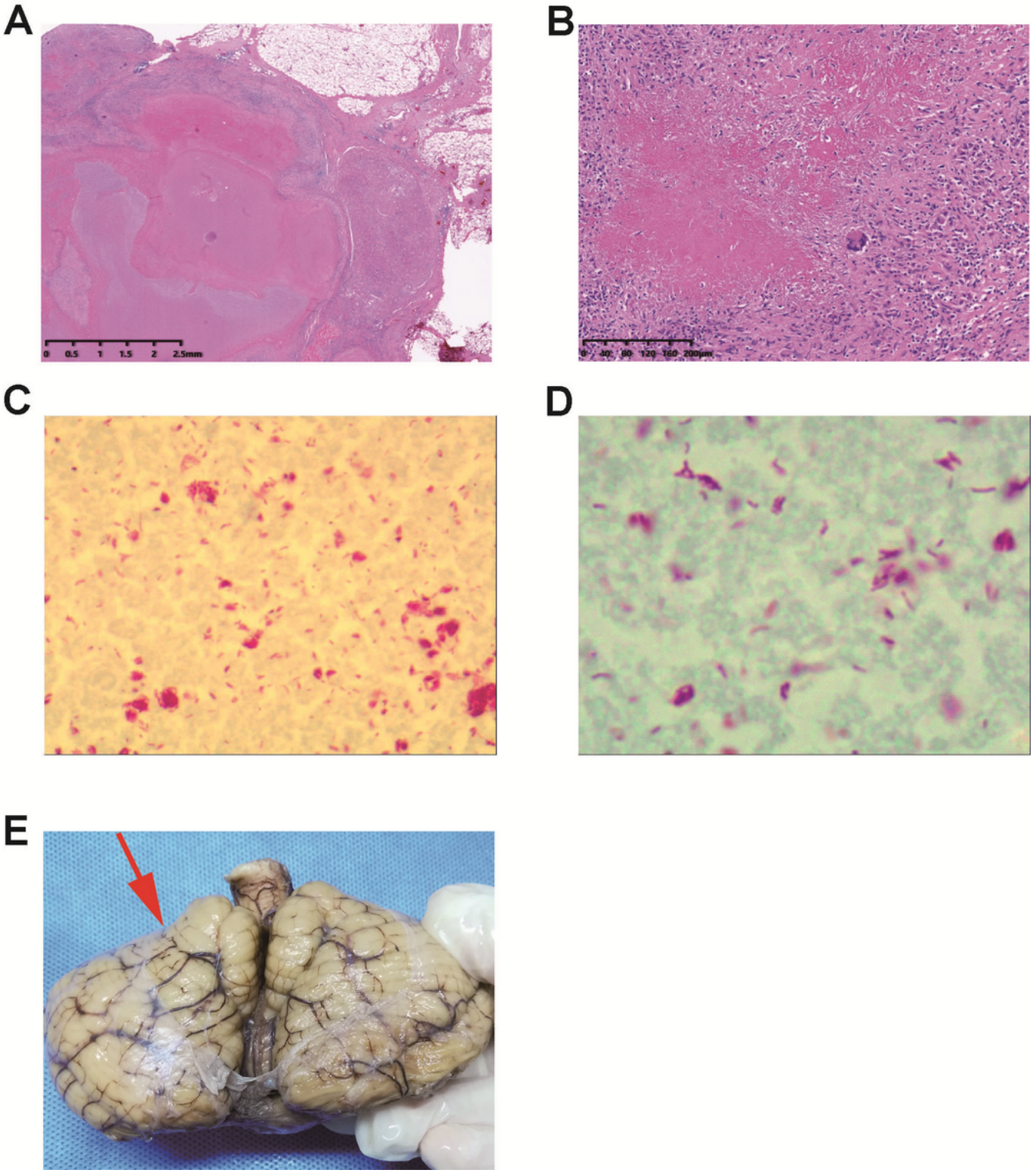

Figure 2

A (HE 1×) and B（HE 10×）Irregular nodules with caseous necrosis result in extensive destruction of left adrenal gland. C (Anti-acid staining 10×) and D (Anti-acid staining 100×) Tuberculosis of left adrenal gland. E Cerebellar tonsillar hernia (red arrow).