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Case report

Sudden unexpected death of a 17-year-old male infected with the influenza virus

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Abstract

We report a case of sudden unexpected death in a 17-year-old male student showing similar clinical background and pathological findings to Reye's syndrome. He was found following cardio-pulmonary arrest in his bed, and was immediately transferred to a hospital. However, resuscitation was not successful. He had a history of high fever of 38.3 °C, general malaise, myalgia, and gastrointestinal discomfort for the 2 days prior to his death, and an injection of pylazolon and medication comprising anti-emetics had been administered the day before he died. His biochemical findings showed almost normal levels of transaminase, electrolytes and protein fractions at the emergency room, but blood from the heart at autopsy revealed a high titer of the influenza A virus. Macroscopically, in addition to considerable fatty metamorphosis of the liver, concentric hypertrophy of the left ventricle, muscular bridge of left anterior descending artery, moderate coronary atherosclerosis, and mild downward displacement of the septal leaflet of the tricuspid valve were noted in the heart. Although panlobular microvesicular fatty infiltration of the liver was seen, deposition of lipid droplets was detected only in hepatocytes by frozen section of several organs. Serial sectioning of the epicardial coronary arteries showed about 50% stenosis at the distal site of the left circumflex artery, and diffuse interstitial fibrosis was evident in the bilateral ventricle and this was relatively severe for his age. In addition, the atrioventricular (AV) node artery showed severe narrowing just before entering the AV node, and downward displacement of the AV node with longitudinal elongation was also remarkable. We consider that the cause of death was sudden cardiac death rather than Reye's syndrome (RS), and that an arrhythmogenic event due to some preceding unusual cardiac lesions may have become overt due to the influenza infection and/or some related disorders. The present case would seem to suggest that a postmortem diagnosis of RS should be determined very carefully in cases of sudden death, even if the general circumstances would seem to be consistent with RS.

Keywords: Reye's syndrome; Sudden death; Coronary artery; Cardiac conduction system; Atrioventricular node artery; Influenza

1. Introduction

Reye's syndrome (RS) is characterized by the combination of liver disease and non-inflammatory encephalopathy [1]. The pathogenesis of RS is

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thought to be a profound failure of the mitochondria [2], but the precise cause of the disorder remains uncertain. Other than an association between RS and the use of aspirin under infection with influenza or some other virus [3–5], some examiners have proposed that the use of anti-emetics could be a significant factor for developing RS [6,7]. On the other hand, a few reports have shown uncommon cases, where sudden death was the first manifestation of RS [8]. Since many examiners have pointed out that the diagnostic criteria of RS which is commonly used [9] are non-specific, it may frequently be difficult for forensic pathologists to diagnose RS only from pathological examinations. We present a thought-provoking case of sudden unexpected death in a 17-year-old student, where RS had appeared to be the cause, and we discuss the problems with diagnosis in such case.

2. Case report

A 17-year-old male student who had been healthy was found having suffered cardio-respiratory arrest (CPA) by his mother in the early morning. He was immediately transferred to the emergency room (ER) of a hospital. Despite intensive attempts at resuscitation, he did not recover. According to his mother, he had complained of a fever (38.3 °C), general malaise, joint pain, myalgia and abdominal discomfort for the 2 days prior to his death, and had visited a general practitioner on the morning of the day before his death. He was diagnosed as suffering from a common cold, and an intramuscular injection of pylazolon was given. According to his mother, his symptoms took a turn for the better after visiting the doctor, and his body temperature had dropped to 36.6 °C by the evening. His mother last saw him watching television in his room eight and a half hours before finding that he had suffered CPA. He had been prescribed oral anti-emetics, anti-histaminics and suppositories of acetoamynophen by the doctor. According to the police investigation, he had not vomited anything, he had taken the anti-emetics and anti-histaminics once, but he had not taken the acetoamynophen.

The laboratory data in the ER was summarized in Table 1. Only slight elevations of potassium and blood glucose were observed.

Table 1
Laboratory data of the victim at ER

Investigation	Value	Normal range
WBC ($\times 10^3$/ml)	6.4	4.0–9.0
RBC ($\times 10^6$/ml)	5.06	4.10–5.50
Hemoglobin (g/dl)	14.2	14.0–17.0
Hematocrit (%)	43.8	40.0–48.0
Platelets ($\times 10^4$/ml)	16.3	13.0–32.0
AST (IU/l)	24	12–17
ALT (IU/l)	26	6–25
LDH (IU/l)	182	125–230
Total Bilirubin (mg/dl)	0.5	0.3–1.2
ALP (IU/l)	299	104–338
CK (IU/l)	142	30–170
Amylase (IU/l)	87	54–168
BUN (mg/dl)	7.5	8–20
Cr (mg/dl)	1.3	0.5–1.2
Total protein (g/dl)	5.8	6.6–8.1
Albumin (g/dl)	3.4	4.1–5.1
Na (mEq/l)	144	139–147
K (mEq/l)	5.4	3.5–4.6
Cl (mEq/l)	102	102–112
BS (mg/ml)	249	80–150
CRP (mg/dl)	1.2	0.0–0.1

Abbreviations: ER, emergency room; WBC, white blood cells; RBC, red blood cells; AST, asparate transaminase; ALT, alanine transaminase; LDH, lactic dehydrogenase; ALP, alkali phosphatase, CK, creatinine kinase; BUN, blood urea nitrogen; Cr, creatinine; Na, sodium; K, potassium; Cl, chloride, BS, blood glucose, CRP, C-reactive protein.

3. Autopsy findings

The autopsy was performed 5 h after death. The body was 177 cm in length and weighed 72 kg. External examination revealed only a fresh scar from the injection in the hip region. From internal examination, the brain weighed 1380 g, and showed slight swelling without herniation. The color of the pia mater was clear, and the coronal sections of the brain after fixation showed slight narrowing of the lateral ventricle.

The heart weighed 386 g, and diffuse interstitial fibrosis was already evident in the whole ventricle, especially in ventricular septum. (Fig. 1A). Mild to moderate atherosclerosis of the coronary artery was found diffusely in all three major branches, but no thrombus was identifiable to the naked eye. After a 2.5-cm subepicardial segment, the left anterior descending artery (LAD) became embedded in