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https://doi.org/10.15017/1495446

出版情報：福岡醫學雜誌. 105 (12), pp.234-240, 2014-12-25. 福岡医学会
バージョン：
権利関係：

Case Report

Medical Neglect Death due to Acute Lymphoblastic Leukaemia : An Autopsy Case Report

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Abstract

We report the case of 2-year-old girl who died of precursor B-cell acute lymphoblastic leukaemia (ALL), the most common cancer in children. She had no remarkable medical history. She was transferred to a hospital because of respiratory distress and died 4 hours after arrival. Two weeks before death, she had a fever of 39℃, which subsided after the administration of a naturopathic herbal remedy. She developed jaundice 1 week before death, and her condition worsened on the day of death. Laboratory test results on admission showed a markedly elevated white blood cell count. Accordingly, the cause of death was suspected to be acute leukaemia. Forensic autopsy revealed the cause of death to be precursor B-cell ALL. With advancements in medical technology, the 5-year survival rate of children with ALL is nearly 90%. However, in this case, the deceased's parents preferred complementary and alternative medicine (i.e., naturopathy) to evidence-based medicine and had not taken her to a hospital for a medical check-up or immunisation since she was an infant. Thus, if she had received routine medical care, she would have a more than 60% chance of being alive 5 years after diagnosis. Therefore, we conclude that the parents should be accused of medical neglect regardless of their motives.

Keywords : Medical neglect・Acute lymphoblastic leukaemia・Naturopathy, Complementary and alternative medicine

Introduction

Neglect is the most common type of child maltreatment[1)] and is defined in American law as "the failure of a parent, guardian, or other caregiver to provide for a child's basic needs[2)]." Medical neglect is defined as the "failure to provide necessary medical or mental health treatment[2)]." The belief system of caregivers often prevents them from seeking appropriate medical care for their children[3)]. Belief systems can be influenced by complementary and alternative medicine (CAM), religion, and cultural factors. Therefore, it is difficult to distinguish medical neglect from parental choice. Here, we report an autopsy case of medical neglect in which an infant died of acute lymphoblastic leukaemia (ALL) because of the lack of proper treatment.

Case Report

A 2-year-old girl was transferred to a hospital because of respiratory distress. She died 4 hours after arrival. Her birth length and weight were 48 cm and 2,848 g, respectively. Since the age of 1

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month, her parents had not taken her for a medical check-up or immunisation, because her mother preferred CAM (i.e., naturopathy) to evidence-based medicine. The patient had 2 sisters who had received medical attention only very rarely. She had no remarkable medical history. Two weeks before death, she had a fever of 39℃, which subsided after the administration of a naturopathic herbal remedy. She developed jaundice 1 week before death, and her condition worsened on the day of death. Laboratory test results on admission showed a markedly elevated white blood cell count (Table 1). As the cause of death was suspected to be acute leukaemia under the medical neglect of her parents, autopsy was performed 40 hours after death.

On autopsy, the deceased was 89 cm tall and weighed 12.5 kg ; both values were within the normal range. There was slight postmortem lividity on the dorsum, and the palms and foot soles were icteric. Intradermal haemorrhage was observed in all extremities, and pitting oedema was observed in the lower extremities.

The brain, liver, kidneys, and spleen were swollen. Moreover, the brain, heart, and kidneys exhibited ecchymosis. Pharyngeal and abdominal lymphadenopathy was remarkable. The left (20 mL) and right (40 mL) thoracic cavity had pleural effusion.

Hematoxylin-eosin staining showed infiltration of small cells with a high nuclear/cytoplasmic ratio in the brain, lungs, heart, liver, kidneys, and spleen (Fig. 1a-f) as well as haemorrhage in the brain, lungs, heart, and kidneys (Fig. 1a-c). The sinoatrial node was completely infiltrated by small cells and the atrioventricular node showed partial infiltration (Fig. 2a, b). As ALL was suspected, May-Grunwald Giemsa staining was performed and revealed many blast cells with an elevated nuclear/cytoplasmic ratio (Fig. 3).

To classify the type of ALL, immunohistochemical staining was performed for myeloperoxidase (MPO), CD3, CD5, CD10, CD20, CD23, CD38, CD45RO, and CD79a on liver and kidney specimens. The following mouse monoclonal antibodies were used : MPO (59A5, Novocastra [Newcastle Upon Tyne, England]), CD3 (PS1, Novocastra), CD5 (4C7, Novocastra), CD10 (56C6, Novocastra), CD20 (L26, Dako [Carpinteria, USA]), CD23 (1B12, Novocastra), CD38 (SPC32, Novocastra), CD45RO (UCHL-1, Novocastra), and CD79a (11E3, Novocastra). Both tissues showed the following results : MPO^- /$CD3^-$ /$CD5^-$ /$CD10^+$ /$CD20^+$ /$CD23^-$/$CD38^-$/$CD45RO^-$/$CD79a^-$ (Figs. 4, 5).

Table 1 Laboratory data at admission

	Data	Reference range
WBC ($\times 10^3/\mu$L)	260.0	3.5-9.1
RBC ($\times 10^4/\mu$L)	87	376-500
Hb (g/dL)	2.2	11.3-15.2
Ht (%)	7.1	33.4-44.9
Plt ($\times 10^4/\mu$L)	5.0	13.0-36.9
Total bilirubin (mg/dL)	0.9	0.3-1.2
AST (IU/L)	84	13-33
ALT (IU/L)	<10	6-30
LDH (IU/L)	1044	119-229
CK (IU/L)	127	45-163
TP (g/dL)	5.3	6.7-8.3
BUN (mg/dL)	15	8-22
Cr (mg/dL)	0.6	0.4-0.7
Na^+ (mEq/L)	138	138-146
K^+ (mEq/L)	4.5	3.6-4.9
Cl^-(mEq/L)	105	99-109
Glucose (mg/dL)	99	69-109
PT (%)	53	≥70
PT-INR	1.47	0.85-1.15
APTT (sec)	25.6	24.0-38.0
Fibrinogen (mg/dL)	133	150-350
FDP (μg/mL)	7	≤5
D-dimer (μg/ml)	3.6	≤1.0

WBC, white blood cells ; RBC, red blood cells ; Hb, haemoglobin ; Ht, haematocrit ; Plt, platelets ; AST, aspartate aminotransferase ; ALT, alanine aminotransferase ; LDH, lactate dehydrogenase ; CK, creatine kinase ; TP, total protein ; BUN, blood urea nitrogen ; Cr, creatinine ; PT, prothrombin time ; PT-INR, prothrombin time-International Normalized Ratio ; APTT, activated partial thromboplastin time ; FDP, fibrin degradation product

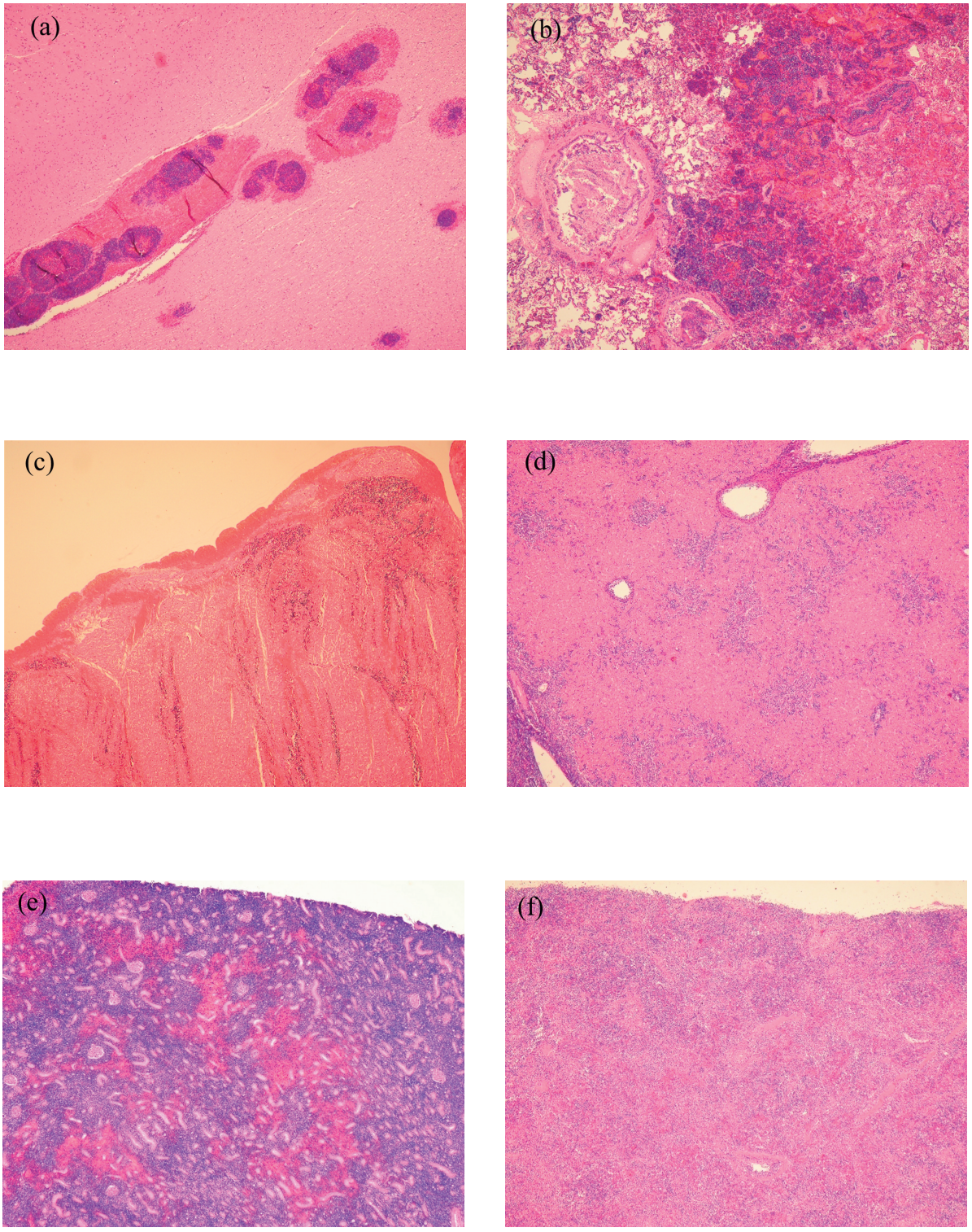

Fig. 1 Hematoxylin–eosin staining of the brain (**a**), lungs (**b**), heart (**c**), liver (**d**), kidneys (**e**), and spleen (**f**) (magnification : × 40)

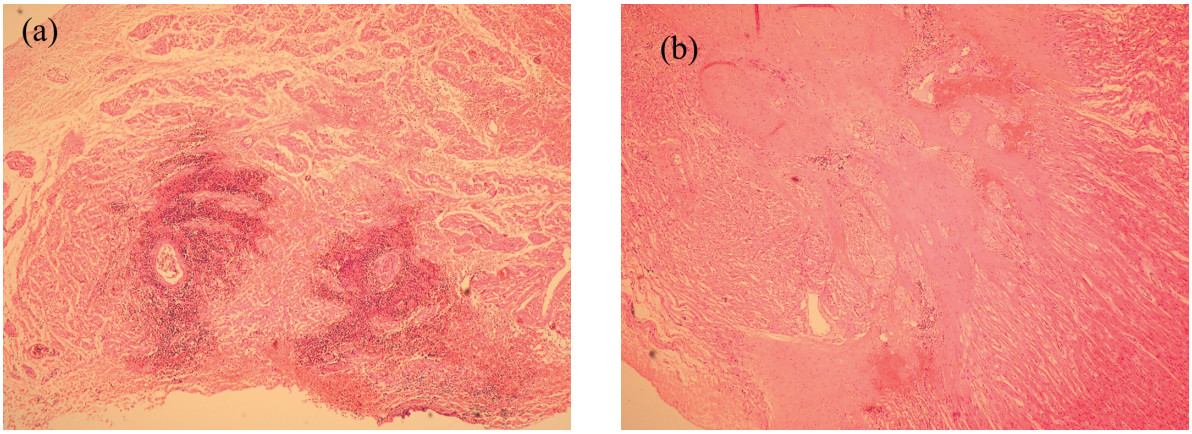

Fig. 2 Hematoxylin-eosin staining of the sinoatrial (**a**) and atrioventricular (**b**) nodes (magnification : × 40)

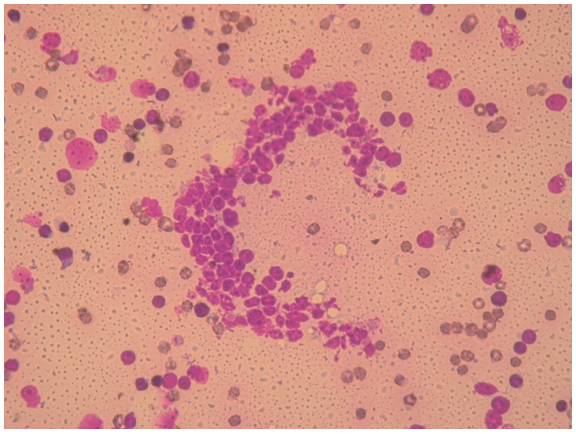

Fig. 3 May-Grunwald Giemsa staining of a smear preparation (magnification : × 400)

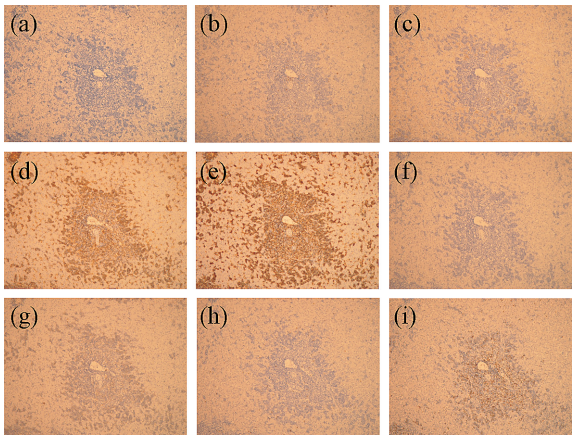

Fig. 4 Immunohistochemical staining for myeloperoxidase (**a**), CD3 (**b**), CD5 (**c**), CD10 (**d**), CD20 (**e**), CD23 (**f**), CD38 (**g**), CD45RO (**h**), and CD79a (**i**) in the liver (magnification : × 100)

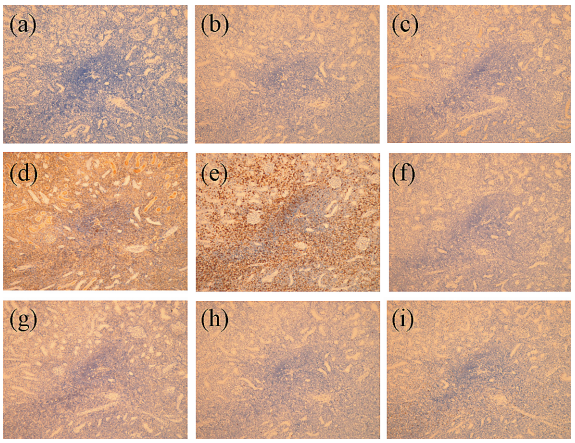

Fig. 5 Immunohistochemical staining for myeloperoxidase (**a**), CD3 (**b**), CD5 (**c**), CD10 (**d**), CD20 (**e**), CD23 (**f**), CD38 (**g**), CD45RO (**h**), and CD79a (**i**) in the kidneys (magnification : × 100)

Discussion

ALL represents a heterogeneous group of clonal haematopoietic progenitor cell disorders[4]. In the present case, May-Grunwald Giemsa and immunohistochemical staining were performed to diagnose and classify the type of ALL. Determining the lineage and maturity of lymphoid malignancies is mandatory for proper patient management. T-cell lineage markers include CD2, CD3, and CD5, whereas B-cell lineage markers include CD19, CD20, and CD79a[5]. However, the "lineage infidelity" of markers is a well-documented phenomenon in lymphoid neoplasms[5]. Therefore, ALL has no specific markers for a conclusive diagnosis. In the present case, staining for CD79a was negative ; it is commonly but not always expressed in B-cell ALL[5~8]. The deceased presumably had precursor B-cell ALL, based on other marker expression patterns.

Although ALL is the most common cancer in children[9], it is an uncommon cause of death in children in forensic practice[10~12]. Forty-five years ago, the 5-year survival rate of children with ALL was$<$1%[9]. The optimised use of anti-leukaemic agents and patient-specific therapy has steadily improved treatment outcomes ; accordingly, a cure rate of nearly 90% is expected in the near future[13]. Patients with precursor B-cell ALL are classified into subgroups according to factors such as age and leucocyte count at diagnosis and are treated accordingly[13]. In the present case, as the deceased was 2 years old ; her chances of survival at 5 years after diagnosis would have been$>$60% if she had received routine medical care[14].

However, the deceased had not been receiving routine medical care, because her parents preferred naturopathy. Naturopathy is a CAM that involves the use of traditional medicinal plants to treat patients. The popularity of many CAMs, including naturopathy, is increasing worldwide, including in Japan[15~19]. However, the pursuit of CAM may act as a barrier to routine medical care, making otherwise treatable illnesses life threatening[20]. The American Academy of Pediatrics reports that parents' failure to seek medical care for their children because of religious views is child neglect if the choice results in substantial harm, suffering, or death despite a condition being treatable[21]. In the present case, the parents should have taken the patient to a hospital by the time she developed jaundice 1 week before death. Therefore, we categorise this case as one of medical neglect. Forensic pathologists must report medical neglect for the advancement of scientific and evidence-based medicine and enhancement of cooperation between evidence-based medicine and CAM.

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(Received for publication November 25, 2014)

（和文抄録）

医療ネグレクトにより急性リンパ性白血病で死亡した1剖検例

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西田尚樹[2)]，池田典昭[1)]

小児腫瘍で最も多い前駆Bリンパ芽球性白血病で死亡した1例を経験したので報告する．2歳女児，特記すべき既往はない．呼吸不全で病院に搬送されたが，4時間後に死亡した．死亡2週間前に39℃台の発熱があったが，自然療法の薬草で改善した．1週間前には黄疸がみられるようになり，死亡当日に状態が悪化した．搬送時の病院での採血で白血球数の著明な上昇がみられたため，急性白血病を疑われた．司法解剖の結果，死因は前駆Bリンパ芽球性白血病と判明した．医学の進歩により，小児のリンパ芽球性白血病の90％程度は診断から5年以上生存している．しかしながら，死者の両親は西洋医学より補完代替療法（自然療法）を好んでおり，死者が産まれてから健康診断や予防接種で病院に連れて行ったことがなかった．死者が通常の医療を受けていれば，5年生存率は60％を超えていたと考えられ，両親の動機によらず，本事例は医療ネグレクトと考えられた．