

## Multiple Intracerebral Hemorrhages Prior to the Diagnosis of Acute Lymphocytic Leukemia

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### Abstract

Intracerebral Hemorrhage (ICH) can be seen in patients with acute leukemia, however, it is extremely rare to present ICH as the initial presentation in previously undiagnosed acute leukemia. Only four cases were reported in the English literature.

This 17-year-old male was admitted with sudden onset of headache, nausea and vomiting. Three days before this admission, he visited an ophthalmological department for bilateral blurred vision. Bilateral retinal hemorrhages were detected by the fundoscopic examination; however, further examinations were not performed at that time. On arrival at our hospital, his Glasgow Coma Scale was 8 (E2, V3, M3) and urgent head CT scan showed multiple Computed Tomography (CT) head demonstrated multiple ICHs. On admission, his White Blood Cell (WBC) count was 584,000/ $\mu$ l with evidence of blast crisis, and platelet count was 18,000/ $\mu$ l. Despite urgent platelet and plasma transfusions, his conscious level deteriorated, and the patient died 12 hours after the admission due to respiratory failure.

The importance of correct diagnosis and early management of leukemia is emphasized, which may prevent blast crisis and disseminated intravascular coagulation leading to fatal ICH.

**Keywords:** Acute leukemia; Blast crisis; Bleeding tendency; Coagulopathy; Intracerebral hemorrhage

### Introduction

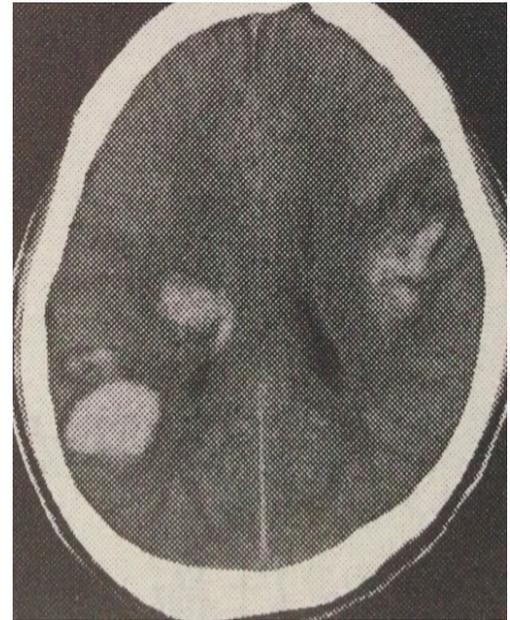
Intracerebral Hemorrhage (ICH) is one of the most catastrophic complications in acute leukaemia [1,2]. However, it is extremely rare to encounter ICH as the initial presentation of previously undiagnosed acute leukemia. To our knowledge, only 4 cases have been reported [3-6]. We present a case of multiple ICHs prior to the diagnosis of acute leukemia.

### Case Presentation

A 17-year-old male was transferred to our emergency department with chief complaints of severe headache, vomiting, and acute onset of unconsciousness. Past medical history and family history were both nil of note, however, 3 days before the admission, he visited an ophthalmologist for bilateral blurred vision. Bilateral retinal hemorrhage was found in fundoscopic examination, and he was referred to a University hospital for further investigation, any other examinations were not performed at that time. On arrival, he became comatose, and multiple ICHs were detected on an urgent head computed tomography (CT) (Figure 1). His white blood cell (WBC) count was 584,000/ $\mu$ l demonstrating blast crisis, and platelet count was 18,000/ $\mu$ l. Peripheral blood smear and flow cytometry confirmed the diagnosis of T-cell type acute lymphocytic leukemia. The hepatic and renal functions were within a normal range. There was no apparent evidence of bruise, petechiae, or internal hemorrhage. Despite urgent platelet and plasma transfusions, he did not respond to our treatment. Subsequently he suffered from respiratory failure and died 12 hours after the admission. Postmortem chromosomal analysis demonstrated chromosome 6p loss.

### Discussion

ICH associated with leukemia may arise from a wide range of various factors, such as vessel wall lesions, leukemic cell invasion, low platelet count, platelet dysfunction, liver damage with the delayed synthesis of coagulation factors, increased plasmin- or elastase-



**Figure 1:** Multiple intracerebral hematomas in right parietal lobe, periventricular and left frontal lobe.

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	Gender	Age (years)	ICH	Platelets ( $\mu$ l)	WBC ( $\mu$ l)	outcome
Chung, et al. [3]	F	24	multiple	10,000	12,700	survived
Kawakami, et al. [4]	F	14	multiple	14,000	128,500	survived
Naunheim, et al. [5]	M	55	single	30,000	92,000	survived
Shiber, et al. [6]	M	19	multiple	30,000	1,210,000	dead
Present Case	M	17	multiple	18,000	584,000	dead

M: Male; F: Female; ICH: Intracerebral Haemorrhage; WBC: White Blood Cell

**Table 1:** Characteristics undiagnosed patients whose initial manifestation were ICH.

induced fibrinolysis, Disseminated Intravascular Coagulation (DIC), anticoagulant therapy, hyperleukocytosis, hypoxia, and sepsis [1-3,7-9] ICH secondary to acute leukemia accounts for approximately 20% of mortality despite recent improvement of chemotherapeutic regimens, targeted pharmacotherapy, and close monitoring of associated coagulation abnormalities [7,8]. Surgical intervention has little role in the management of ICH with coagulopathy such as leukemic blast crisis [2]. Four previous cases of ICH as the initial presentation in undiagnosed leukemic patients were studied particularly on the clinical manifestations, management, and pathogenesis (Table 1). Surgical intervention was not performed in all of the previously reported cases. The median age of the reported cases is 25.8 (range, 14-55) years old, and male female ratio is 3:2. The average platelet count is 24,000/ $\mu$ l (range 10,000-30,000/ $\mu$ l) and the average WBC count is 405,440/ $\mu$ l (range 12,700-1,210,000/ $\mu$ l). Three patients were successfully treated with conservative intervention correction of coagulopathy. Chern et al. insists that leukemia patients with ICH should be managed with platelet transfusions until the platelet level exceeds 50,000/ $\mu$ l. On average, Chern's group transfused 16 units of platelet within the first 36 hours of ICH [2]. In our case, although we transfused 10 units of platelet soon after the admission, he did not respond to the intervention and died without any clinical improvement. Thus initiation of chemotherapy regimen could not be performed.

Our patient visited an ophthalmologist with a chief complaint of bilateral blurred visions 3 days before the onset of conscious disturbance. Bilateral localized retinal hemorrhages were observed, however, further examinations were not performed at that time. Abnormal fundal hemorrhage in young adults should be investigated further for hematological disorders such as leukemia, Hodgkin and non-Hodgkin lymphoma, myeloproliferative and myelodysplastic syndrome as well as coagulopathies [10]. Although it is extremely difficult to determine outcome of the patient, prompt appropriate investigation might have lead to earlier and correct diagnosis. Furthermore, this might have influenced outcome of this patient. We would like to emphasize not only the importance of prompt and appropriate investigation, but also the importance of expanding horizons in natural history of acute lymphocytic leukemia.

## Conclusion

ICH as the initial presentation of acute leukemia can lead to high mortality. Our case suggests that correct and urgent diagnosis is crucial in management of ICH with acute leukemia.

## Disclosure

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