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# T-cell acute lymphoblastic leukemia in an adolescent presenting with peripheral facial paralysis: A case report and literature review

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## ABSTRACT

A cause of visiting a pediatric emergency department is facial paralysis. Although it is mostly idiopathic, it may also be the first finding of malignancies such as leukemia. Corticosteroid therapy decreases blast counts and may postpone leukemia diagnosis. Before starting corticosteroid treatment for facial paralysis in pediatric patients, it is essential to perform a complete blood count and peripheral smear evaluation.

## Introduction

A 17-year-old male patient who presented with peripheral facial paralysis and was diagnosed with T-cell acute lymphoblastic leukemia (T-ALL) was discussed in this report, and a literature review on pediatric patients who had no previously known malignancy and were diagnosed with leukemia after presenting with facial paralysis was performed.

## Case Presentation

A 17-year-old male patient was admitted to the ear, nose, and throat diseases outpatient clinic with complaints of impaired vision, numbness, and decreased facial movement in the left half of his face. The child was referred to the pediatric neurology outpatient clinic for a systemic evaluation because of the appearance of new complaints and the lack of improvement after corticosteroid treatment for the diagnosis of peripheral facial paralysis. On physical examination, multiple lymphadenopathic and left peripheral facial paralysis were detected in the pediatric neurology clinic. The enlarged lymph nodes were 2 cm in the bilateral anterior and posterior cervical chains, 1.5 cm in the submandibular region, 1.5 cm in the bilateral axilla, and 1-1.5 cm in the bilateral inguinal region. He also had limited outward gazing, strabismus, and ptosis in the left eye.

Complete blood count (CBC), routine biochemistry tests, and other laboratory tests were within normal limits. There were no atypical cells/blasts in the peripheral smear. The patient was re-admitted two days later with complaints of shortness of breath and fever unresponsive to antipyretics. Oxygen saturation was

96%, body temperature was 38.6 °C, heart rate was 100 beats/min, and the lymph nodes were further enlarged compared with the previous admission. CBC and routine biochemistry tests were still within the normal range. However, immature cells were observed in the peripheral smear, and a bone marrow biopsy was planned.

Widening of the superior mediastinal shadow by a prominent thymus on chest X-ray (Figure 1) and soft tissue density filling the anterior mediastinum on contrast-enhanced thoracic tomography were consistent with an enlarged thymic tissue. The superior vena cava and left brachiocephalic veins were also compressed, causing mild to moderate stenosis in the superior vena cava and severe stenosis in the left brachiocephalic vein.

Following a true-cut biopsy of the anterior mediastinum and bone marrow aspiration and biopsy, the patient was diagnosed with T-ALL. Central nervous system imaging and cerebrospinal fluid examinations were within normal limits. The ALL Berlin-Frankfurt-Münster 2000 chemotherapy protocol was initiated. When the blast count in the peripheral blood examination exceeded 1000 cells/mm$^3$ on the eighth day of the protocol, the patient was considered to be at high risk. Because he did not have a fully compatible donor, the patient underwent haploidentity hematopoietic stem cell transplantation from his mother on the 72$^{nd}$ day.

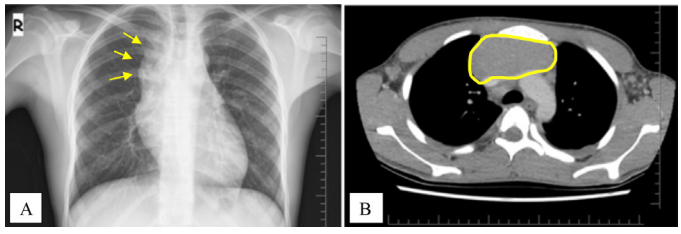


**Figure 1.** A) Increased thymus shadow on X-ray, B) Soft tissue density (enlarged thymic tissue) that completely fills the anterior mediastinum on computed tomography

## Discussion

Facial paralysis is one of the causes of pediatric emergencies. Although most cases are idiopathic (e.g., Bell's palsy), the most prevalent underlying condition in children is acute otitis media, as well as Lyme disease in endemic areas. Malignancies are extremely rare causes of facial paralysis. Central nervous system tumors constitute the most common neoplastic cause of facial paralysis, followed by leukemias (1).

Facial paralysis as the first sign of leukemia is extremely rare. In a study by Babl et al. (2), the incidence of newly diagnosed leukemia in children with acute-onset peripheral facial paralysis was reported to be 0.6%.

It is thought that facial paralysis in leukemias develops because of a direct invasion of leukemic cells into the nerve or underlying infectious factors such as Epstein-Barr virus and human T-cell lymphotropic virus (3). Seventeen newly diagnosed pediatric leukemia patients with facial paralysis as a presentation finding were reported between 1984 and 2023. Eleven of them had acute myeloblastic leukemia, five had ALL, and one had chronic lymphoblastic leukemia. Only two pediatric cases of T-ALL have been reported before the current pediatric case having facial paralysis at the time of leukemia diagnosis (2-13) (Table 1).

**Table 1. Our patient and seventeen newly diagnosed pediatric leukemia patients with facial paralysis as a presentation finding between 1984 and 2023**

| Reference number | Age | Additional finding | Diagnosis |
|---|---|---|---|
| Our patient | 17 years | Periodontitis, lymphadenopathy | T-ALL |
| 2 | 8 years | Exophthalmos | AML |
| 2 | 7 years | Acute otitis media, pneumonia | T-ALL |
| 2 | 5 years | Acute otitis media | Pre B-ALL |
| 2 | 9 years | Blurred vision | T-ALL |
| 3 | 8 months | Acute otitis media and anemia | AML |
| 4 | 18 months | Acute otitis media | AML |
| 5 | 10 months | Recurrent fever | AML |
| 6 | 1 month | Fontanel strain | CML |
| 7 | 32 months | Exophthalmos | AML |
| 8 | 11 months | - | ALL |
| 8 | 11 months | Ataxia, irritability, and hepatosplenomegaly | AML |
| 8 | 6 years | Fever, pain | ALL |
| 9 | 17 years | Paraplegia | AML |
| 10 | 13 years | Mastoiditis | AML |
| 11 | 6 years | Acute otitis media, mastoiditis, hearing loss | AML |
| 12 | 5.5 years | Mastoiditis | AML |
| 13 | 4 months | Hepatosplenomegaly, lymphadenopathy | AML |

T-ALL: T-cell acute lymphoblastic leukemia, AML: Acute myeloblastic leukemia, CML: Chronic myeloblastic leukemia, Pre B-ALL: Precursor B-cell ALL

According to the 2013 American guidelines, laboratory examination is not recommended for the etiology of facial paralysis unless there is a history of residing in a Lyme-specific region (14). In a retrospective study by Babl et al. (2), it was recommended to evaluate CBC before starting corticosteroid therapy when investigating the etiology of pediatric patients, particularly those with idiopathic facial paralysis.

Glucocorticoid therapy is recommended in adult guidelines (14); however, its effectiveness for treating Bell's palsy in pediatric patients is debatable (15). Thus, more research is required to determine the effective corticosteroid dose, drug type, and duration of treatment.

On the other hand, while steroids are still used for the treatment of Bell's palsy, they are also included in the treatment protocols for ALL and most lymphoma types (2). In this context, patients on corticosteroid therapy can have normal CBC values and peripheral smears because corticosteroid treatment may delay leukemia and other oncological diagnoses. Furthermore, even in the absence of corticosteroid treatment, some patients may have normal CBC and peripheral smears at leukemia diagnosis (5).

## Conclusion

T-ALL follows a more favorable course in pediatric patients than in adult patients, and the efficacy of corticosteroid therapy is debatable. Corticosteroid therapy may delay the diagnosis of leukemias by reducing the number of blasts in the peripheral blood and suppressing symptoms. In contrast, pediatric patients presenting with facial paralysis should have CBC and a peripheral smear.

### Ethics

**Informed Consent:** Consent form was filled out by the participant.

### Authorship Contributions

Concept: O.G., Design: O.G., Data Collection or Processing: B.Y., O.G., Analysis or Interpretation: B.Y., O.G., Literature Search: B.Y., Writing: B.Y.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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