Acute Lymphoblastic Leukemia (ALL)

Definition: ALL is a malignancy that occurs due to **hematopoietic dysregulation** causing **clonal expansion** of a single **lymphoid progenitor cell** or **blast cell**.

Epidemiology: ALL is one of the **most common childhood malignancies**. Accounting for 25-30% of childhood cancer diagnoses. Peak incidence is between **2-5** years of age.

TYPES

- B-Cell ALL (80-85%)
- T-Cell ALL (10-15%)
- Leukemia of ambiguous lineage (2-5%)

RISK FACTORS

- Exposure to Ionizing radiation
- Genetic conditions such as Trisomy 21, Bloom syndrome, and Fanconi Anemia

PRESENTATION

Common Symptoms:

- Unexplained Fever (60%)
- Fatigue (50%)
- Pallor (40%)
- Night Sweats (15-30%)
- Bone or joint pain (Up to 25%)
- Nose or gum bleeding and unexplained bruising/ petechiae (up to 50%)

PHYSICAL EXAM

- Hepatosplenomegaly
- Pallor/ bruising/ petechia
- Generalized lymphadenopathy
- Fever
- Testicular swelling

INITIAL INVESTIGATIONS

Laboratory Studies:

- CBC with differential
- Peripheral blood smear
- Electrolytes, Creatinine, Calcium, Phosphate, Urate, LDH
- Liver function tests
- PT, PTT, and fibrinogen

CONFIRMATORY TESTING

Bone Marrow Studies:

- Cell count analysis (>20% blast cells)
- Immunophenotyping
- Karyotype and molecular studies

CSF Studies

- Chemistry, cell count, and cytospin

SUPPLEMENTAL TESTING

Imaging

- Chest X-Ray (rule out mediastinal mass)
- Scrotal ultrasound if suspected testicular involvement

Cardiac

- ECHO (to assess cardiac baseline)
- ECG

LAB FINDINGS

- Pancytopenia
- WBC may be low, normal or elevated
- Prolonged PT and PTT
- Decreased Fibrinogen
- Elevated LFTs
- Tumor lysis labs

TUMOR LYSIS SYNDROME LABS

- Hyperkalemia
- Hypocalcemia
- Hyperphosphatemia
- Elevated urate
- Elevated LDH

MANAGEMENT

- 3 Stages of Chemotherapy
  - Induction
  - Consolidation
  - Maintenance
- Multidisciplinary team involvement
- Long-term follow up

Overall, 5-year survival is >90%

CHEMOTHERAPY SIDE EFFECTS

- Nausea/ Vomiting
- Mucositis
- Anorexia/ weight loss
- Pancytopenia
- Immunosuppression & increased infections
- Hair loss

ALL EMERGENCIES:

- Sepsis
- Hyperleukocytosis/ leukostasis
- Tumor lysis syndrome
- Disseminated intravascular coagulation (DIC)

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