INITIAL EVALUATION OF THE CHILD WITH A SUSPECTED MALIGNANCY

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INTRODUCTION

► Each year ± 6500 children < 15 years : diagnosed with cancer in the US.
► Cancer : the second leading caused death in children.
► > 65% of children diagnosed with cancer to now to be cured of their diseases.
► The diagnosis of cancer with a history & physical examination.
► Environmental & genetics associated with the development of malignancy.
► Treatment : start after accurate diagnosis & staging.
### COMMON CHIEF COMPLAINTS GIVEN PARENTS THAT SUGGEST A PEDIATRIC CANCER

<table>
<thead>
<tr>
<th>Chief complaint</th>
<th>Suggested cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic drainage from ear</td>
<td>Langerhan’s cell histiocytosis</td>
</tr>
<tr>
<td>Recurrent fever with bone pain</td>
<td>Leukemia, Ewing’s sarcoma, neuroblastoma</td>
</tr>
<tr>
<td>Morning headache with vomiting</td>
<td>Brain tumor</td>
</tr>
<tr>
<td>Lump in neck that doesn’t respond to antibiotics</td>
<td>Hodgkin’s or non-hodgkin’s lymphoma, leukemia</td>
</tr>
<tr>
<td>White dot in eye</td>
<td>Retinoblastoma</td>
</tr>
<tr>
<td>Swollen face and neck</td>
<td>NHL, leukemia</td>
</tr>
<tr>
<td>Mass in abdomen</td>
<td>Wilm’s tumor, neuroblastoma, hepatoma</td>
</tr>
<tr>
<td>Paleness &amp; fatigue</td>
<td>Leukemia, lymphoma</td>
</tr>
<tr>
<td>Limping</td>
<td>Osteosarcoma, leukemia</td>
</tr>
<tr>
<td>Bone pain</td>
<td>Leukemia, Ewing’s sarcoma, neuroblastoma</td>
</tr>
<tr>
<td>Bleeding from vagina</td>
<td>Rhabdomyosarcoma, Yolk sac tumor</td>
</tr>
<tr>
<td>Weight loss</td>
<td>Hodgkin’s lymphoma</td>
</tr>
<tr>
<td>Mass in extremity</td>
<td>Rhabdomyosarcoma</td>
</tr>
</tbody>
</table>
## PRESENTING SIGNS & SYMPTOMS OF SOME COMMON PEDIATRIC CANCERS & THEIR DIFF. DIAGNOSIS

<table>
<thead>
<tr>
<th>PRESENTING SIGNS OR SYMPTOMS</th>
<th>COMMON DIAGNOSISI (NONMALIGNAT CONDITIONS)</th>
<th>CANCER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache, morning vomiting</td>
<td>Migraine, sinusitis</td>
<td>Brain tumor</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>Infection</td>
<td>Lymphoma, leukemia</td>
</tr>
<tr>
<td>Bone pain</td>
<td>Infection, trauma</td>
<td>Bone tumor, leukemia</td>
</tr>
<tr>
<td>Abdominal mass</td>
<td>Constipation, kidnet cyst, full bladder</td>
<td>Wilm’s tumor, neuroblastoma</td>
</tr>
<tr>
<td>Mediastinal mass</td>
<td>Infection, cysts</td>
<td>Lymphomas</td>
</tr>
<tr>
<td>Pancytopenia</td>
<td>Infection</td>
<td>Leukemia</td>
</tr>
<tr>
<td>Bleeding</td>
<td>Coagulation disorders, platelet disorders, ITP</td>
<td>Leukemia, neuroblastoma</td>
</tr>
<tr>
<td>Back pain</td>
<td>Trauma</td>
<td>Leukemia, lymphoma, CNS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tumor or extension of abdominal tumor into spinal cord</td>
</tr>
</tbody>
</table>
1. LEUKEMIA

 ► Incidence :
  - 4/100,000 children < 15 years, the peak incidence is between 2 & 5 yrs of age.
  - ALL (75%) & AML (20%) of the total number of cases leukemia.

 ► Clinical manifestation :
  - Marrow invasion :
    - Anemia, thrombocytopenia, leukopenia, neutropenia
  - Pallor, Fatigue
  - Tachycardia, fever, bleeding
  - Hepatosplenomegali
  - CNS : Morning headache, cranial n. VI palsy, vomiting, papilledema
Diagnostic studies:

- Complete blood count (CBC), differential, review peripheral blood smear.
- Bone marrow aspiration ⇒ The presence of 25% or more blasts.
- Metabolic panel (liver function, electrolyte, renal function).
- Coagulation profile
- Blood culture if febrile.
- Chest radiograph: to evaluate the possible presence of mediastinal mass.
# COMMON CLINICAL & LABORATORY FEATURES OF ALL AT PRESENTATION

<table>
<thead>
<tr>
<th>Findings</th>
<th>Percentage of patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>60</td>
</tr>
<tr>
<td>Pallor</td>
<td>40</td>
</tr>
<tr>
<td>Bleeding</td>
<td>50</td>
</tr>
<tr>
<td>Bone pain</td>
<td>25</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>50</td>
</tr>
<tr>
<td>Splenomegaly</td>
<td>60</td>
</tr>
<tr>
<td>Hepatosplenomegaly</td>
<td>70</td>
</tr>
<tr>
<td>White blood cell count (µl)</td>
<td></td>
</tr>
<tr>
<td>&lt; 10.000</td>
<td>50</td>
</tr>
<tr>
<td>10.000 – 49.000</td>
<td>30</td>
</tr>
<tr>
<td>≥ 50.000</td>
<td>20</td>
</tr>
<tr>
<td>Hb (g/dl)</td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>40</td>
</tr>
<tr>
<td>7.0 – 11.0</td>
<td>45</td>
</tr>
<tr>
<td>&gt; 11.0</td>
<td>15</td>
</tr>
<tr>
<td>Platelet (µl)</td>
<td></td>
</tr>
<tr>
<td>&lt; 20.000</td>
<td>30</td>
</tr>
<tr>
<td>20.000 – 99.000</td>
<td>45</td>
</tr>
<tr>
<td>≥ 100.000</td>
<td>25</td>
</tr>
</tbody>
</table>
2. RETINOBLASTOMA

- Incidence: 1/18,000 live birth in the United State.
- The most common: < 2 years.
- Bilateral: 20-30% of patients.
- The tumor from retina.

- Clinical manifestation:
  - A white pupilary reflex: leukocoria/ Cat's eyes reflex.
  - Strabismus
  - Orbital inflammation, hyphema
  - Proptosis
  - Pain
3. LYMPHOMAS

► 10 - 12% of malignancies in children.
► 60% : Non-Hodgkin’s Lymphoma (NHL) of all lymphomas.
► Clinical manifestation :

HODGKIN’S LYMPHOMAS

► Incidence :
  ▪ with a peak in 15 -34 years and 55 - 74 years.
  ▪ Slight male predominant.
  ▪ Rarely in children younger than 5 years.
► Characterized by progressive enlargement of the lymph nodes with extension to contiguous nodes.
► Cellular immunodeficiency is present in >50%.
► Mediastinal adenopathy : 60% of the cases.
HODGKIN’S LYMPHOMAS

Enlargement of the lymph nodes
HODGKIN’S LYMPHOMA
NON-HODGKIN'S LYMPHOMA

- 1.5 times as common of Hodgkin’s lymphomas.
- The incidence in children increasea with age.
- Children with congenital or acquired dysfunction of immune system:
- Mayor histologic subtypes: large cell, lymphoblastic, undifferentiated.

Clinical manifestation:
- NHLs can arise any where in the body, primarily in the lymph nodes, Waldeyer ring, peyer patches, & bone marrow.
- Nausea, vomiting, & abdominal distention, superior vena cava syndromes.
LIMFOMA NON HODGKIN

ENLARGEMENT OF LYMPH NODES
4. NEUROBLASTOMA

- The most common solid tumor in childhood outside the CNS, 7% of all malignancies.
- The peak incidence: 2 years of age.

Clinical manifestation:
- It present as:
  - A tumor mass along sympathetic ganglia.
  - An abdominal mass (70%).
- Tumor can also be found: neck, thorax, & pelvis.
- The signs & symptoms depend on the site of the tumor, size & degree of spread.
- Hepatomegaly, anemia, a coagulopathy, bone pain.
- Racoon eyes with periorbital hemorrhage.

► Diagnostic evaluation:
  - History
  - Physical examination
  - Laboratorium studies
  - Diagnostic imaging: CT scan
  - Biopsy
Summary of Neuroblastoma Progression
Analysis of phenotypic and clinical characteristics of tumours in relation to genetic abnormalities identifies three distinct types of neuroblastoma (adapted from Lastowska et al. 2000)
5. NEFROBLASTOMA (WILMS TUMOR)

► It’s a tumor of the developing kidney.
► The second retroperitoneal tumor in children.
► Approximately: 6% of childhood malignancies.
► Occurs in young children: 1 & 5 years.

► Clinical manifestation:
  - Abdominal mass
  - Abdominal pain, malaise, hypertension, microscopic hematuria.
  - Bleeding: → Anemia, pallor, fatigue
  - Thrombus, polycythemia.
6. RABDOMYOSARCOMA

- Incidence: 5 - 8% of childhood cancers.
- It's occur at virtually any anatomic site.
- Most often found: head & neck (40%), genitourinary tract (20%), extremities (20%), trunk (10%).

- Clinical manifestation:
  - A mass that may or may not be painful.
  - Symptoms due to displacement or obstruction of normal structure.
  - Nasal congestion, epistaxis, mouth breathing, cranial nerve paralysis, blindness, headache, vomiting, trismus, etc.
RHABDOMYOSARCOMA
7. TERATOMA

- Germ cell neoplasma >> in the children.
- Incidence: 4.2 cases permillion population per year.
- In males: most common in white.
- Male: female = 1:4

- Clinical manifestation:
  - Present as masses, depends on location.
  - AFP is elevated.
SACROCOCCYGEAL TERATOMA
8. OSTEOSARKOMA

► The high risk period: the adolescent growth spurt.
► Patient: taller than their peers of similar age.
► Etiology: unknown.

► Clinical manifestation:
  ▪ Pain & swelling: >>>
  ▪ Initial complaints: sport injury & sprain.
  ▪ Limitation of motion, joint effusion, tenderness, warmth.
OSTEOSARKOMA
THANK YOU