Common Pediatric Malignancies

Leukemia, Bone Tumors, Brain Tumors, and Neuroblastoma

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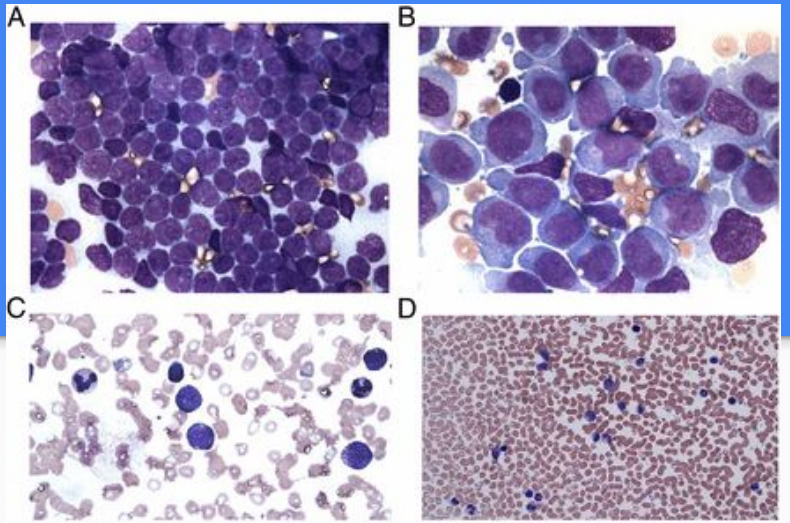
Leukemia

- Presentation:
  - Kids can present with bone pain and a limp due to bone marrow expansion
  - Don’t forget B-symptoms: Fever, Weight Loss, Night Sweats
  - Because you cannot produce other cells within the bone marrow well, symptoms correlate to what cell lines are down:
    - Anemia: Fatigue, pallor, dyspnea
    - Thrombocytopenia: bruising, petechiae
- Exam: Look for lymphadenopathy, hepatosplenomegaly, and check for testicular disease

Leukemia

- Studies
  - CBC: will show multiple cell lines down, including anemia, thrombocytopenia, and neutropenia
  - Bone marrow aspirate: Needed for diagnosis, usually a morphologic analysis and flow cytometry will be done
  - Imaging is usually done for staging as well, such as a PET/CT
- Treatment
  - Peripheral chemotherapy and intrathecal chemotherapy are done depending on the leukemia, and can include tyrosine kinase inhibitors
  - Radiation can be a part of treatment
  - Bone marrow transplant is a last resort

Types of Leukemia



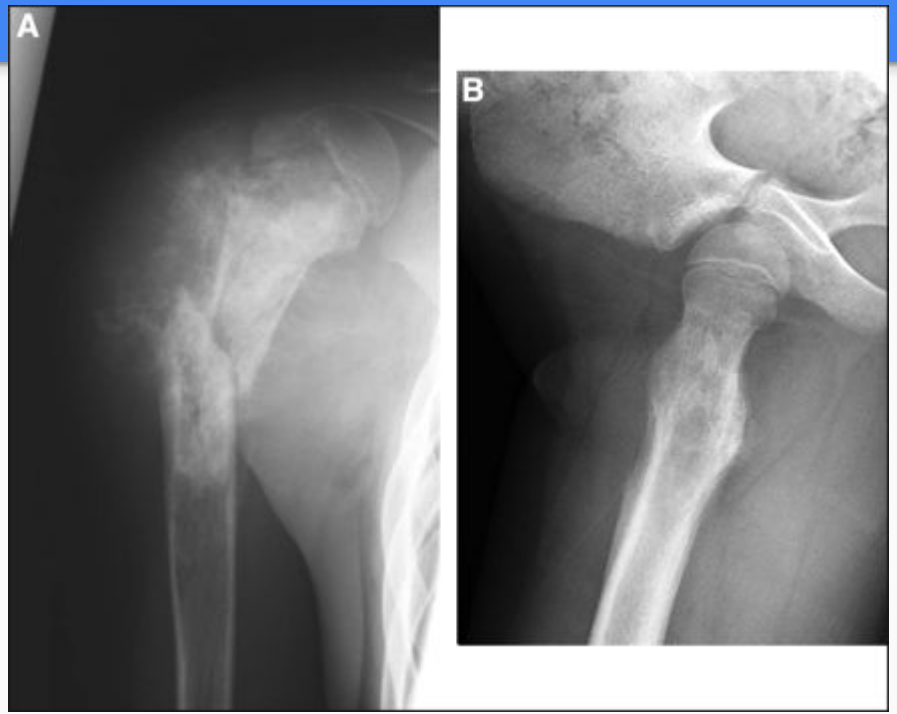
- Acute Lymphoblastic Leukemia: The most common subtype of leukemia; usually, precursor B-cell ALL is more common than T-cell ALL. (A)
    - Usually, mediastinal mass differential includes T-cell ALL
- Acute Myelogenous Leukemia (B): Less common subtype. Also includes Acute Promyelocytic Leukemia (C). Can present with bleeding and DIC
- Chronic Myelogenous Leukemia (D): Think adolescents, with presentation of splenomegaly and extremely high WBC.

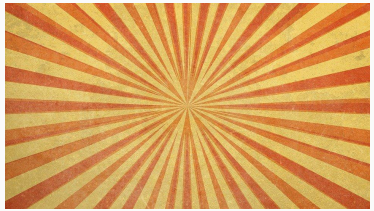
Bone Tumors

- Presentation
  - Usually can be an incidental finding; patients are asymptomatic
  - However, can present with pain, swelling, decreased range of motion, and a hard mass. Pain present while resting at night.
- Studies
  - Can do labs but nonspecific
  - CT will help with diagnosis, will still need biopsy
- Treatment
  - Usually a combination of chemotherapy and surgery to remove the lesion (amputation versus replacement)

The Scary: Osteosarcoma v. Ewing's Sarcoma

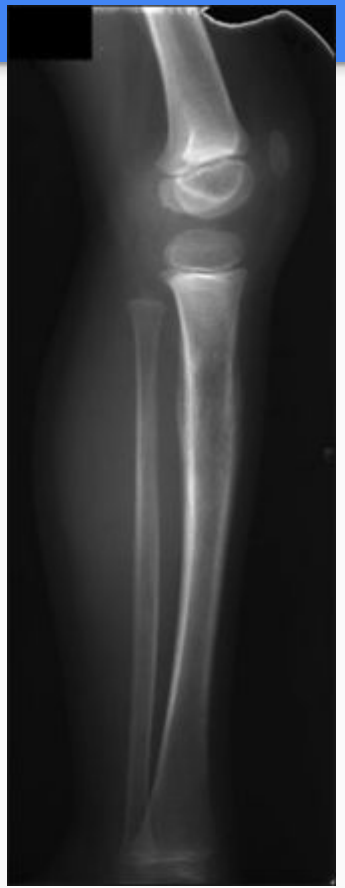
	Osteosarcoma	Ewing's Sarcoma
Age/Etiology	Most common primary bone tumor, tends to be in older kids > 10	Second most common in children and adolescent, tends to be < 10
Pathology	Osteoid tissue	Undifferentiated, small, round cell tumor
Common locations	Around the knee, but affects long bones and originates in metaphysis	Metadiaphyseal of long bones, but can also be found in the pelvis and lumbosacral spine





Osteosarcoma: “Sunburst” meaning sclerotic, destructive, bone forming lesion with mineralization

Ewing: “Onion skinning” “hair on end”, meaning a mixed sclerotic and lytic lesion.



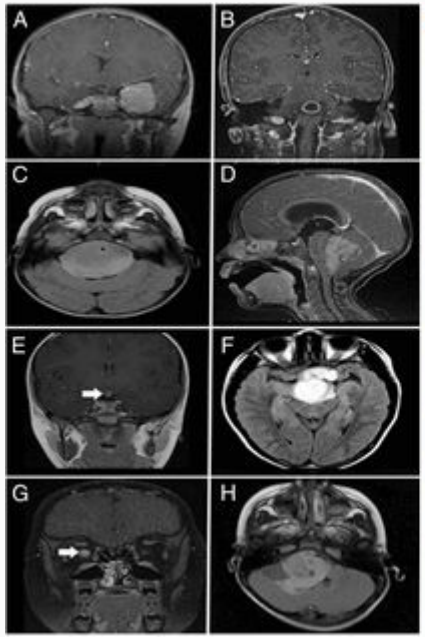
Brain Tumors

- Presentation
  - Headache (especially if wakens at night), nausea/vomiting (especially when awakening)
  - Other sign and symptoms are dependent on where the tumor is
  - Look for signs of CSF obstruction: Headache, nausea/vomiting, gait imbalance, papilledema; younger infants consider macrocephaly and lethargy
- Exam: Make sure to do a good neuro exam, that includes a head circumference and a good skin exam looking for neurocutaneous lesions
- Studies
  - CT scan can be done but the best imaging for diagnosis is MRI with and without contrast
  - Final diagnosis is pathology from biopsy or resection
- Syndromes prone to brain tumors: NF-1, NF-2, Tuberous Sclerosis, Li-Fraumeni (p53), Gardner Syndrome, Turcot Syndrome, Gorlin Syndrome

Brain Tumors

Large Variety of Tumors:

- In children 0-4, the most common types of tumors are posterior fossa tumors
- Pathology wise, the most common are:
  - Juvenile pilocytic astrocytoma (neuroepithelial)
  - Medulloblastoma (most common)
  - Ependymoma
  - Atypical teratoid rhabdoid tumor



	Signs and Symptoms	Diagnosis
A	Headache, seizures, hyperpigmented macules	Meningioma, neurofibromatosis 2
B	Vomiting, facial weakness, ataxia, double vision	Glioblastoma multiforme
C	Nystagmus, facial weakness, ataxia, dysphagia	Diffuse intrinsic pontine glioma
D	Recurrent vomiting	Medulloblastoma
E	Nocturnal enuresis	CNS germinoma
F	Failure to thrive, visual abnormalities	Suprasellar juvenile pilocytic astrocytoma
G	Visual loss, hyperpigmented macules	Optic glioma, neurofibromatosis type 1
H	Facial weakness, ataxia, early morning vomiting	Ependymoma

Brain Tumors

- Management
  - Establishing an airway if needed
  - Acute hydrocephalus needs neurosurgery stat
  - Otherwise, treatment is usually surgical removal, and depending on the pathology will guide if further treatment is necessary
  - For certain tumors may even monitor only

Neuroblastoma

- Presentation
  - Abnormal growth of embryonic neural crest cells that can appear in any part of the sympathetic nervous system, including the adrenal glands, paraspinal ganglia, and rarely the brain
  - May see fever, malaise, pallor, fussiness, and localized pain surrounding lesion
  - Odd symptoms to look for:
    - Opsoclonus-myoclonus syndrome (multi directional movements of eyes with involuntary muscle spasms)
    - Blueberry muffin rashes, cutaneous nodules that appear purpuric, heterochromia irides, periorbital ecchymosis
    - If around spinal cord, can get compression symptoms

Neuroblastoma

- Studies
  - Labs: CMA, HVA are catecholamine metabolites that are elevated; spot urine level is sufficient of diagnosis
    - CBC/CMP to look for metastases to liver or bone marrow
  - MRI for evaluation of further disease
  - mIBG: nuclear medicine scan to look for mets
- Treatment
  - Dependent on location, size, aggressiveness, and lab evidence, can go between observation to chemotherapy +/- surgery.
  - Radiation and immunotherapy options saved for relapse

References

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