# Oncologic Emergencies

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Attending physician

# Objectives

- Objectives:
  - Recognize oncologic emergencies
  - Recognize when immediate steps need to be taken

Objectives

# Case 1: Patient CO

- 12-year-old male, previously healthy
  - Never wheezed before, no F Hx of asthma
- 3-4 week h/o wheezing, easy fatigue
- Decreased exercise tolerance
- Treated with ventolin and 3 courses of prednisone
- Symptoms worsened as steroids were weaned

Case 1: Patient CO

# Case 1: Patient CO

- Admitted to OSH 9/15/00 for "asthma exacerbation" placed on vent nebs and prednisone w/taper
- Readmitted 9/21/00 w/1 week history of
  - Cough, especially with eating and drinking
  - Increasing SOB
  - 3-4 pillow orthopnea
  - Decreased po intake and 5 pound wt loss
  - Drenching night sweats for 2 nights

# Case 1: Patient CO, exam

- Afebrile, RR 30-40, HR 130-140
- Gen: audibly stridulous, short sentences, sitting at a 90+ degree angle
- HEENT: MM dry, no facial edema
- Neck: JVD, edematous, Bilat LAD
- CV: tachycardic, no murmur
- Lungs: tight I/O wheeze, retractions, decreased BS left base



Case 1; Patient CO, exam

# Case 1: Patient CO, exam

- Chest: prominent veins R>L, 2-3 cm boggy mass inferior to clavicle on R
- Abd: tight musculature, liver to umbilicus, spleen palpable
- LAD: left axilla, bilateral inguinal area



Case 1: Patient CO, exam

# Case 1: Patient CO, labs

- WBC: 14.1
- Diff: 73 segs, 14 lymphs, 11 monos, 2 eos
- Hemoglobin: 16.4 gm/dL
- Platelets: 252,000
- Uric acid 5.4, LDH 701
- BUN 12, Cr 0.6, K 4.1, CO2 22
- ESR: 3

Case 1: Patient CO, labs

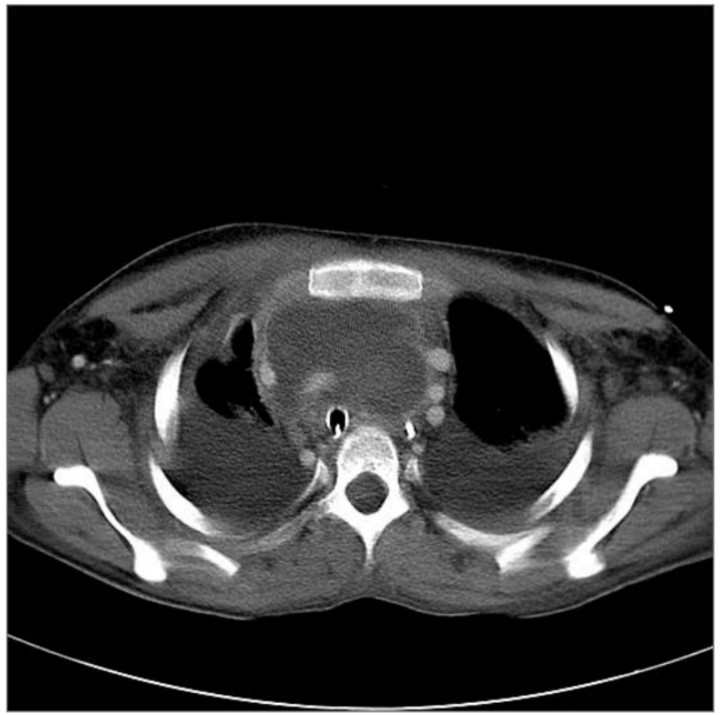
# Case 1: Patient CO, labs

Chest X-ray



Case 1: Patient CO, labs

# Case 1: Patient CO



CT-scan



Case 1: Patient CO

# Case 1: Patient CO, course

- Arrangements made to start emergency radiation and chemotherapy
- Rapid respiratory deterioration
  - Became anxious, air hungry
  - Facial plethora, edema
  - Difficult to ventilate via bag and mask
  - Generalized tonic clonic seizure
  - Intubated

Case 1: Patient CO, course

# Case 2: Patient CM

- 9-year-old Chinese female
  - Adopted at 17 months old
  - History of pneumonia at 2 years old
- 2 weeks PTA complained of left hip pain
- Saw PMD: PE and X-rays reportedly normal
- Hip pain resolved, but then developed right arm pain
- 2 ½ week history of nighttime facial swelling thought due to latex balloon exposure



Case 2: Patient CM

# Case 2: Patient CM

- 3 days PTA had one time fever of 101
- 2-3 days PTA
  - fatigue
  - shortness of breath
  - intermittent nasal congestion
  - heart racing noted by parents
  - petechiae under eyes, no easy bruising
- Weight loss ?
- Denies night sweats or chills, ROS negative otherwise



Case 2: Patient CM

# Case 2: Patient CM, exam

- Temp 38.7, HR 126, RR 22, BP 129/69
- Pulse ox 89% on RA, 92% on 2.5 L O2
- General: pale, nasal flaring
- HEENT: facial swelling
- Neck: shotty 1 cm right ant cervical LAD
- Lungs: tachypnea, decreased BS at bases
- CV: II/IV systolic murmur, no gallop
- Abd: liver 1 cm below RCM
- Skin: petechiae on face, chest



Case 2: Patient CM, exam

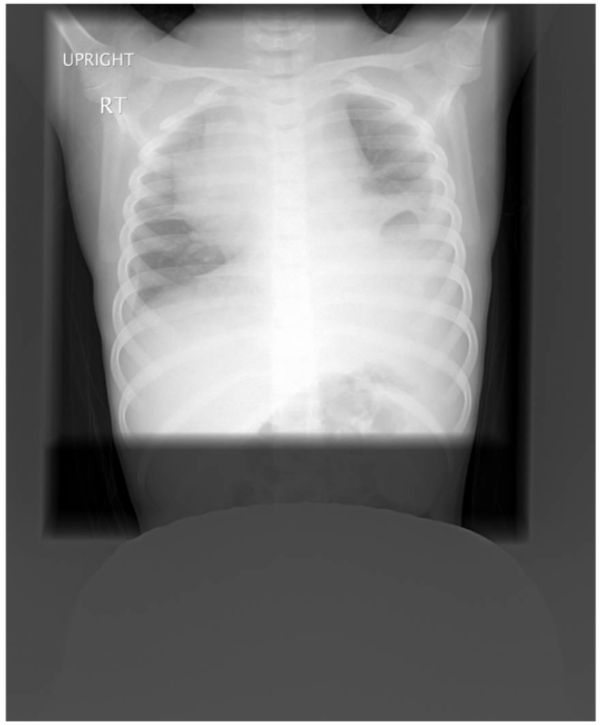
# Case 2: Patient CM, labs

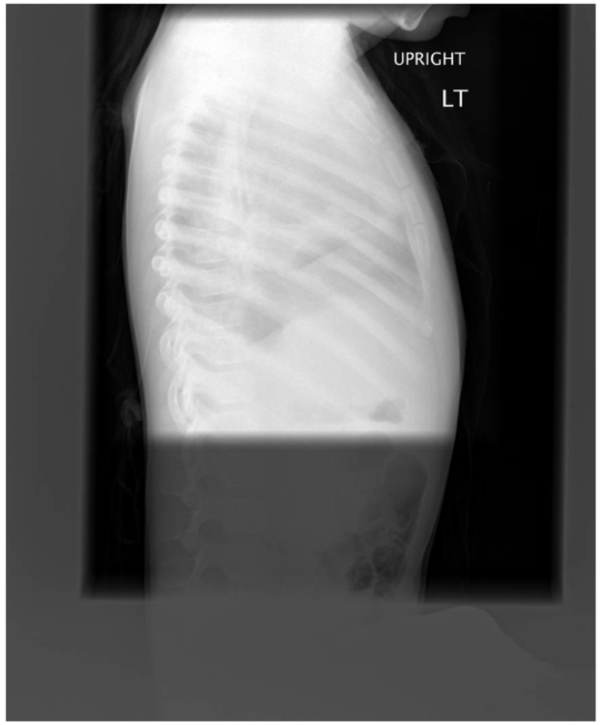
- CBC
  - WBC 16.9, diff 4 neutrophils, 35 lymphs, 2 monos, 56 blasts (ANC 676)
  - Hemoglobin 5.7 gm/dL
  - Platelets 9,000
- CMP
  - Lytes normal (K 4.2, Ca 8.5, PO4 4.2)
  - Uric acid 5.8 (nl <5.0)
  - LDH 4085 (nl <750)
- Coagulation
- PT/PTT 13.1/24.5 seconds



Case 2: Patient CM, labs

# Case 2: Patient CM, X-ray






Case 2: Patient CM, X-ray

# Case 2: Patient CM, course

- Admitted to ICU
- Transfused RBC and platelets
- Supportive care with fluids, antibiotics
- Anesthesia consult for sedation prior bone marrow aspirate and lumbar puncture

Case 2: Patient CM, course

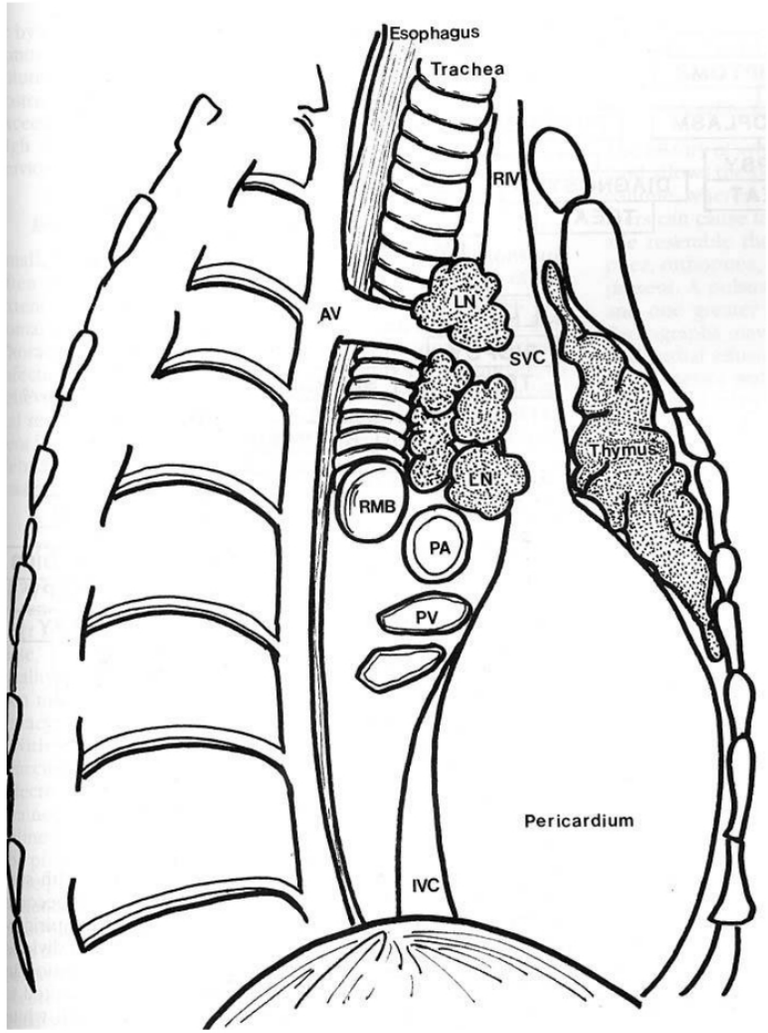
# Pathophysiology

SVC Syndrome = Compression, Obstruction, Thrombosis of SVC

Sup. Mediastinal Syndrome =

SVC plus tracheal compression

- Used synonymously



# Causes of SVCS/SMS:

## Anterior Mediastinal Masses

- **Benign**
  - S/P congenital heart repair***
  - CVL thrombosis
  - Infection
    - Histoplasmosis
    - Tuberculosis
    - Staph. aureus
- Bronchogenic cyst
- Big thymus

- **Malignant**
  - Terrible Ts
    - T-cell-NHL/ALL***
    - Hodgkins diseaseB-cell LC NHL
    - Teratoma (GCT)
    - Thymoma
    - Thyroid

Posterior mediastinal masses cause respir distress:

neuroblastoma, neurenteric cysts, sarcomas, GCTs.

Causes of SVCS/SMS

# Assess Anesthesia / Sedation Risk


- Moderate Sedation
- Ketamine (ICU drug of choice)

Assess Anesthesia/Sedation Risk

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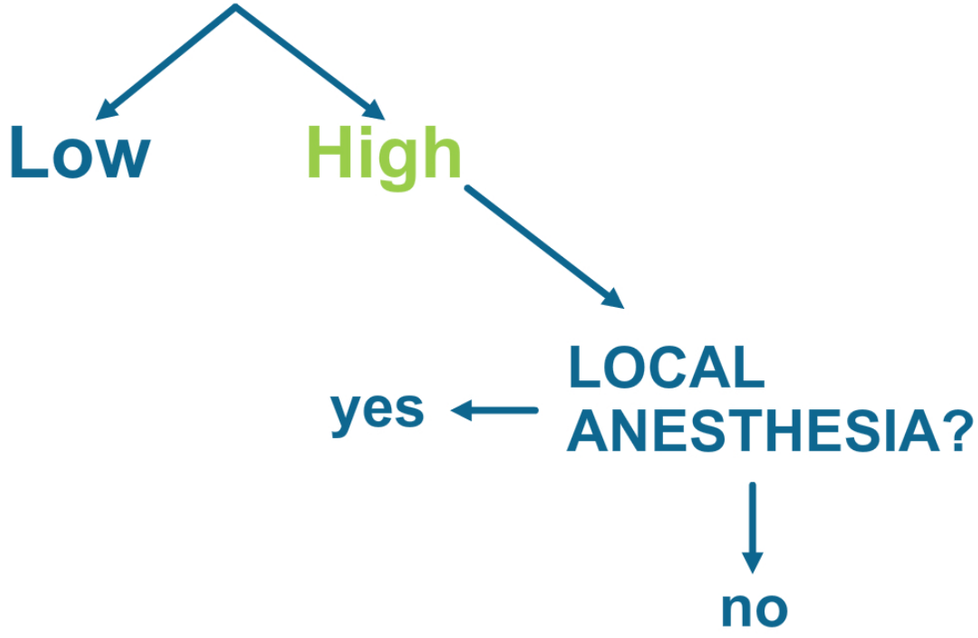
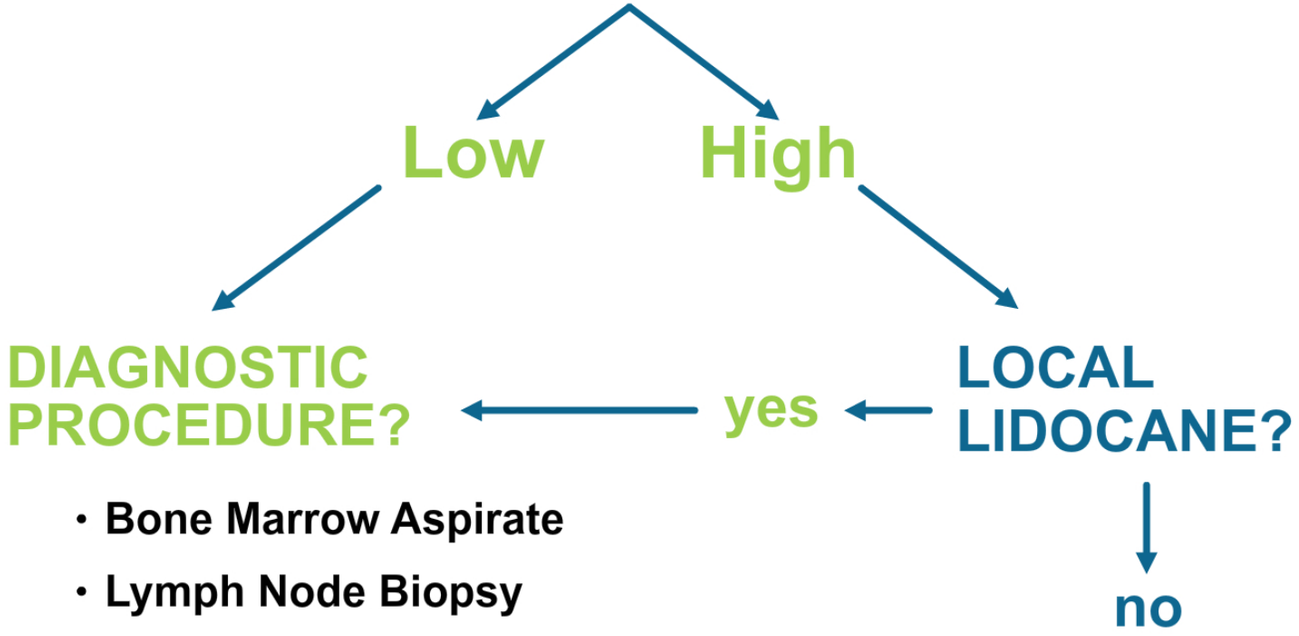



Assess Anesthesia/Sedation Risk

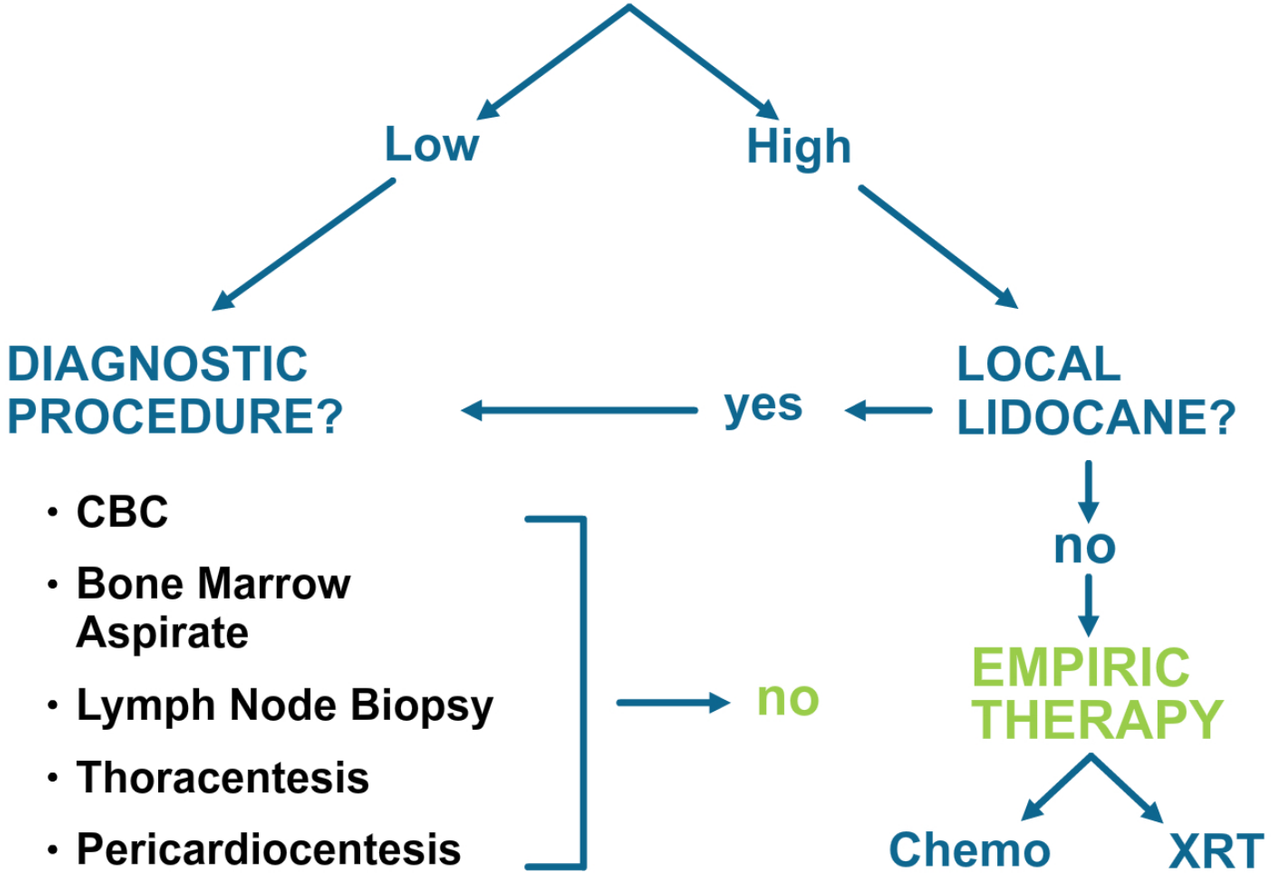
# Assess Anesthesia / Sedation Risk




- Bone Marrow Aspirate
- Lymph Node Biopsy
- Thoracentesis
- Pericardiocentesis
- IR biopsy

Assess Anesthesia/Sedation Risk

# Assess Anesthesia / Sedation Risk




Assess Anesthesia/Sedation Risk

# Empiric therapy

**Solumedrol - IV 1mg/kg q6°**

**Chemotherapy**

Cyclophosphamide
Vincristine
Anthracycline

- Leukemia
- NHL
- HD

**Both**

**Radiation Therapy**

100- 300cGy BID
for 1-3 days

- Sarcomas
- Neuroblastoma
- Germ Cell Tumors

Empiric therapy

# Final Diagnoses

- Case 1: Patient CO
  - Anaplastic lymphoma
  - Very resistant to therapy due to heavy pretreatment with steroids
  - Ultimately responded to chemotherapy and high dose radiation, but has permanent tracheotomy, complications with TE fistula, recent stroke
- Case 2: Patient CM
  - Pre T ALL
  - Remains in remission 4+ years off therapy

Final Diagnoses

# Case 3: KW

- 18 month old, small for age, otherwise healthy
- Several days of fever, abdominal fullness
- Bruising increasing over same time period
- DOA: cough and increased work of breathing, vomiting
- Sent by PMD to emergency room for evaluation

Case 3: KW

# Case 3: KW exam

- Afeb, 166, 48, 128/81, weight 10 kg
- Pale, fussy toddler, nasal flaring, “sick”
- 2/6 systolic murmur
- Liver 5 cm, spleen 5 cm
- LAD: inguinal and axillary
- Scattered bruises on legs, back

Case 3: KW exam

# Case 3: KW labs

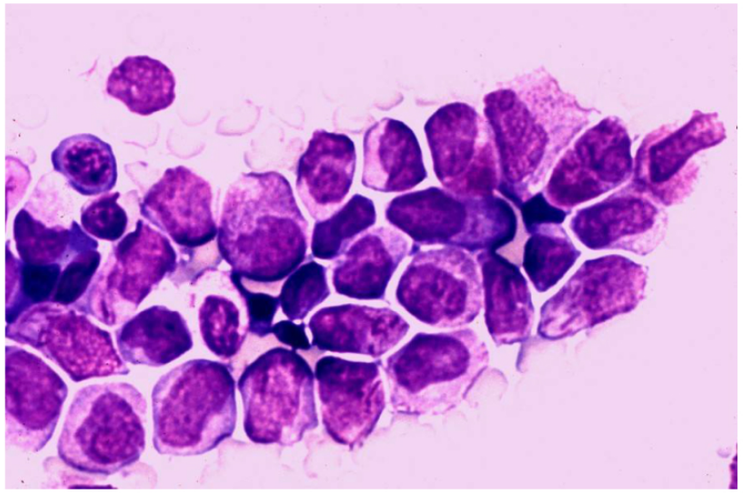
- CBC
  - WBC 193,000
  - Hemoglobin 5.3
  - Platelets 6,000
- CMP
  - K 5.5, BUN 12, Cr 0.3
  - Uric acid 6.6, LDH 4997
  - ESR 60
  - PT/PTT normal
- CXR: no mass

Case 3: KW labs

# Hyperleukocytosis

- Defined as a WBC > 100K
- Affects 10% of patients with leukemia
- Hemorrhagic infarct risk increases with:

AML > 200K WBC
ALL > 300K WBC
CML > 500K WBC



# Complications

**TABLE 38-11.** *Early complications in patients with hyperleukocytosis*

| Complications | ALL ($N = 161$) | ANLL ($N = 73$) | $p$ Value* |
|---|---|---|---|
| Metabolic† | 22 | 4 | 0.08 |
| Hyperkalemia | 16 | 2 | |
| Decreased calcium/ /increased phosphorus | 15 | 3 | |
| Acute renal failure | 5 | 4 | |
| Respiratory | 0 | 6 | <0.001 |
| Hemorrhagic | 4 | 14 | <0.001 |
| CNS | 2 | 9 | |
| Gastrointestinal | 0 | 2 | |
| Pulmonary | 2 | 3 | |
| Pericardial | 0 | 1 | |
| Death | 8 | 17 | <0.001 |

# Management

- Evaluate for CNS or respiratory symptoms.
- Immediate hydration
- TLS precautions
- Transfuse platelets if < 20,000
- Avoid PRBC if hemodynamically stable
- Leukopheresis if high WBC or symptomatic
- Anti-leukemia therapy when stable

# Case 4: JT

- 8 year old, active boy
- 2-3 week history of fatigue, decreased stamina with play, some increased bruising
- Good appetite
- No fevers, viral symptoms, ill contacts
- No bone pain
- Going to school full time

Case 4: JT

# Case 4: JT exam

- Generally well, slightly pale
- Shotty ant and post cervical LAD
- Heart and lungs CTA
- Liver edge palpable, spleen 1-2 cm below LCM
- GU and neurologic exam unremarkable
- Sent for labs and told he could go to school

Case 4: JT exam

# Pt JT: Laboratory Studies

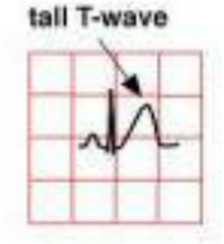
- CBC: WBC 36, hemoglobin 9.6, platelets 57,000
- Differential: 4 neutrophils, 70 lymphs, 26 atypical lymphs
- BMP: Na 135, K 6.0, BUN 98, Cr 4.5

Pt JT: Laboratory Studies

# Tumor Lysis Syndrome

- Results from release of intracellular contents of dying tumor cells
- Can occur at presentation, but usually manifests itself 12-72 hrs from start of therapy
- Most commonly seen with ALL, Burkitt's and  lymphoblastic lymphoma
- Less with AML, CML, large cell lymph, HD
- Rarely with NBL, GCT

# Pathophysiology




Hyperkalemia

LYSIS

- Chovstek's
- ↑QTc

2° Hypocalcemia

Hyperphosphatemia

Hyperuricemia

Uric acid crystals

Calcium Phosphate Crystals
(CA x $PO_4$ = 60)

RENAL FAILURE

# Fluid Management

- **Hydration**
  - $D_5$1/4NS w/ 40mEq/L $NaHCO_3$ - NO K+
  - 2 - 4 times maintenance
- **Alkalinization**
  - Maintain urine pH 7.0-7.5
  - Stop $NaHCO_3$ if serum > 30 mEq/L
- **Diuresis**
  - Urine Output > 100ml/$m^2$/hr
  - Keep urine Sp.Grav < 1.010
  - Lasix/Mannitol if needed

# Metabolic Management

- Check labs every 4-12 hours as needed
- **Hyperuricemia**
  - Allopurinol - 10mg/kg/day, TID
  - Urate Oxidase – IV - ICU use only
- **Hyperkalemia**
  - Kayexalate, Calcium Gluconate
  - Insulin & 25% Glucose
- **Hyperphosphatemia** - Amphogel
- **Hypocalcemia** - do not treat unless sx
- **Hypokalemia** - do not treat unless < 2

# Case 4: JT diagnosis

- TL management initiated upon arrival
- Lytes, renal function stabilized overnight
- BMA and LP c/w T cell ALL with CNS involvement
- CNS relapse early in maintenance
- Remains in remission now 8+ years s/p matched sibling BMT

Case 4: JT diagnosis

# Symptoms of Cancer in Children

- **Generalized**
  - Lymphoma
  - Leukemia
  - Neuroblastoma
  - Ewing's sarcoma
- **Headache (+ n/v)**
  - Brain tumors
  - Leukemia
- **Seizure**
  - Brain tumors
- **Adenopathy**
  - Lymphoma
  - Neuroblastoma
  - Leukemia
  - Soft tissue sarcomas
  - Thyroid tumors
- **Masses**
  - Depends on location
- **HSM**
  - Neuroblastoma
  - Lymphoma, leukemia
  - Hepatic tumors
- **Difficulty voiding**
  - Soft tissue sarcoma in bladder or prostate
- **Bone pain**
  - Osteosarcoma
  - Ewing's sarcoma
  - Non-Hodgkin's lymphoma
  - Neuroblastoma
  - Leukemia

Symptoms of Cancer in Children

# When to Refer to Oncology

- Further studies may be indicated if common signs and symptoms don't resolve with the usual interventions
  - i.e.: persistent adenopathy despite antibiotics

- Unusual complaints that deserve immediate evaluation
  - Pallor accompanied by limp/bone pain
  - Unexplained weight loss
  - New onset wheezing, especially w/facial swelling
  - Soft tissue mass without history of trauma

# Summary

- Cancer relatively rare in children
- Often presentation mimics other processes
- It is not clear that early diagnosis impacts outcome in most cases
- However, early diagnosis may cause less distress for families and physicians
- When the history isn't quite right – keep a broad differential

# Questions?

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**Send an email:** choprefonco@email.chop.edu

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