

**Project:** Ghana Emergency Medicine Collaborative

**Document Title:** Oncologic Emergencies

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# **Oncologic Emergencies**

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# **Oncologic Emergencies**

## **Introduction**

- **Malignancy is 2nd leading cause of death in U.S.**
- **Now cancer has 52 % 5 year survival overall**
- **Rx of complications can be life-saving since causative tumor often is curable**
- **Rx of complications can, at a minimum, improve quality of life**

# List of Major Emergency Complications of Malignancy

- Upper airway obstruction
- Malignant pericardial tamponade
- Superior vena cava syndrome
- Acute spinal cord compression
- Hypercalcemia
- Hyperviscosity syndrome
- Hyperleukocytic syndrome
- Acute tumor lysis syndrome
- SIADH
- Adrenal insufficiency / crisis
- Thrombocytopenia / hemorrhage
- Immunosuppression / infection

# Upper Airway Obstruction by Malignancy

- **Causative tumors :**
  - Laryngeal ca
  - Thyroid ca
  - Lymphoma
  - Metastatic lung ca
- **Retropharyngeal abscess**

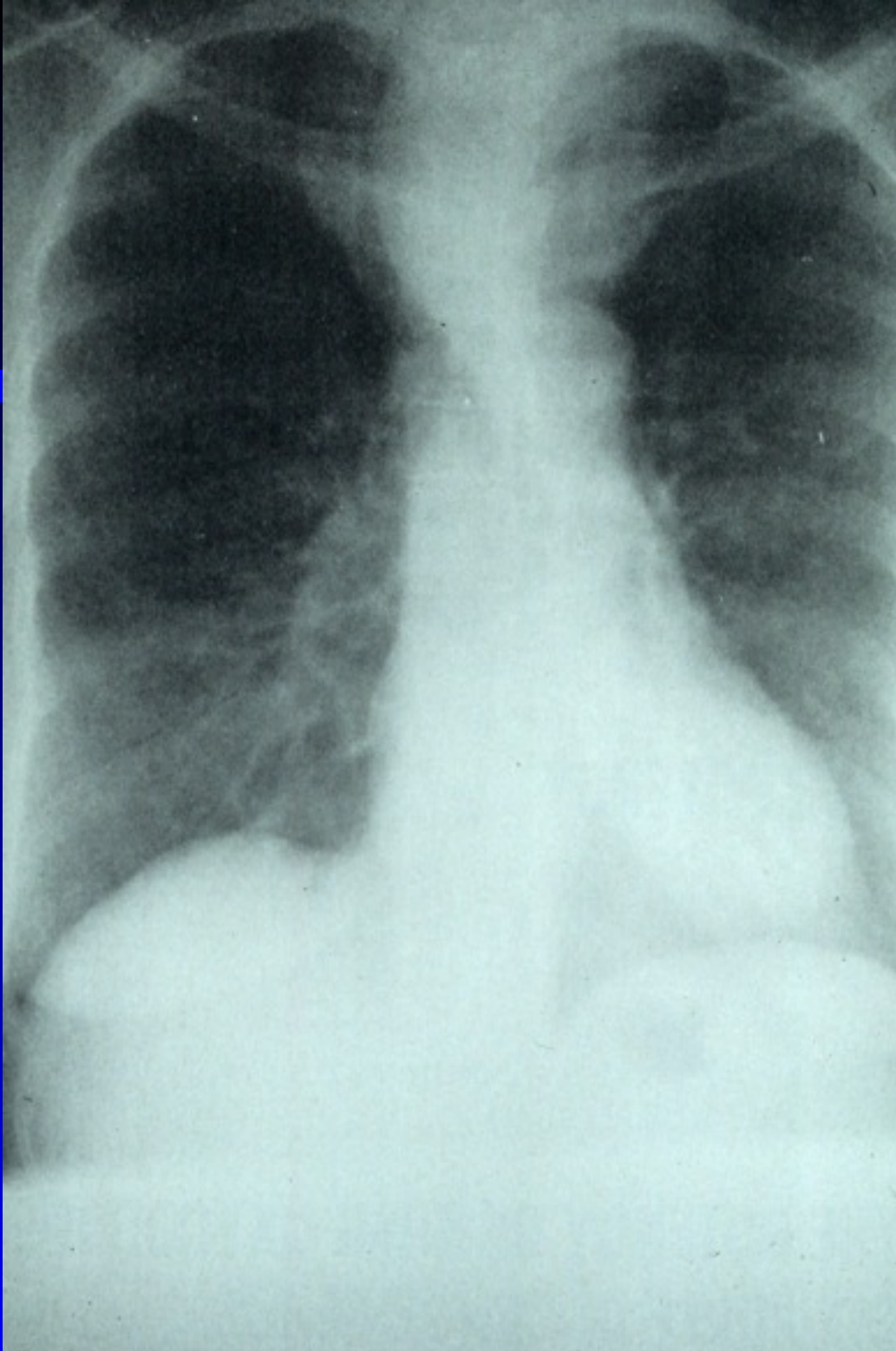
# Upper Airway Obstruction by Malignancy

- **Symptoms**
  - Voice change
  - Hoarseness
  - Neck fullness
  - Dysphagia
  - Stridor
  - Dyspnea
- Usually progresses & presents subacutely, unless food aspiration, infection, hemorrhage, or inspissated secretions occur

# Upper Airway Obstruction by Malignancy

- **Diagnosis**
  - Lateral soft tissue neck film
  - CXR
  - Fiberoptic laryngoscopy





**Tracheal deviation from a  
substernal goiter**

# Upper Airway Obstruction by Malignancy

- **Treatment**
  - **Oxygen**
  - **Racemic epinephrine aerosol (1.0 to 1.5 cc)**
  - **Helium / oxygen (Heliox) inhalation**
  - **? IV steroids or diuretics**
  - **Intubation over fiberoptic laryngoscope**
  - **Consider tracheostomy**
  - **? emergency radiation Rx**

# Malignant Pericardial Tamponade

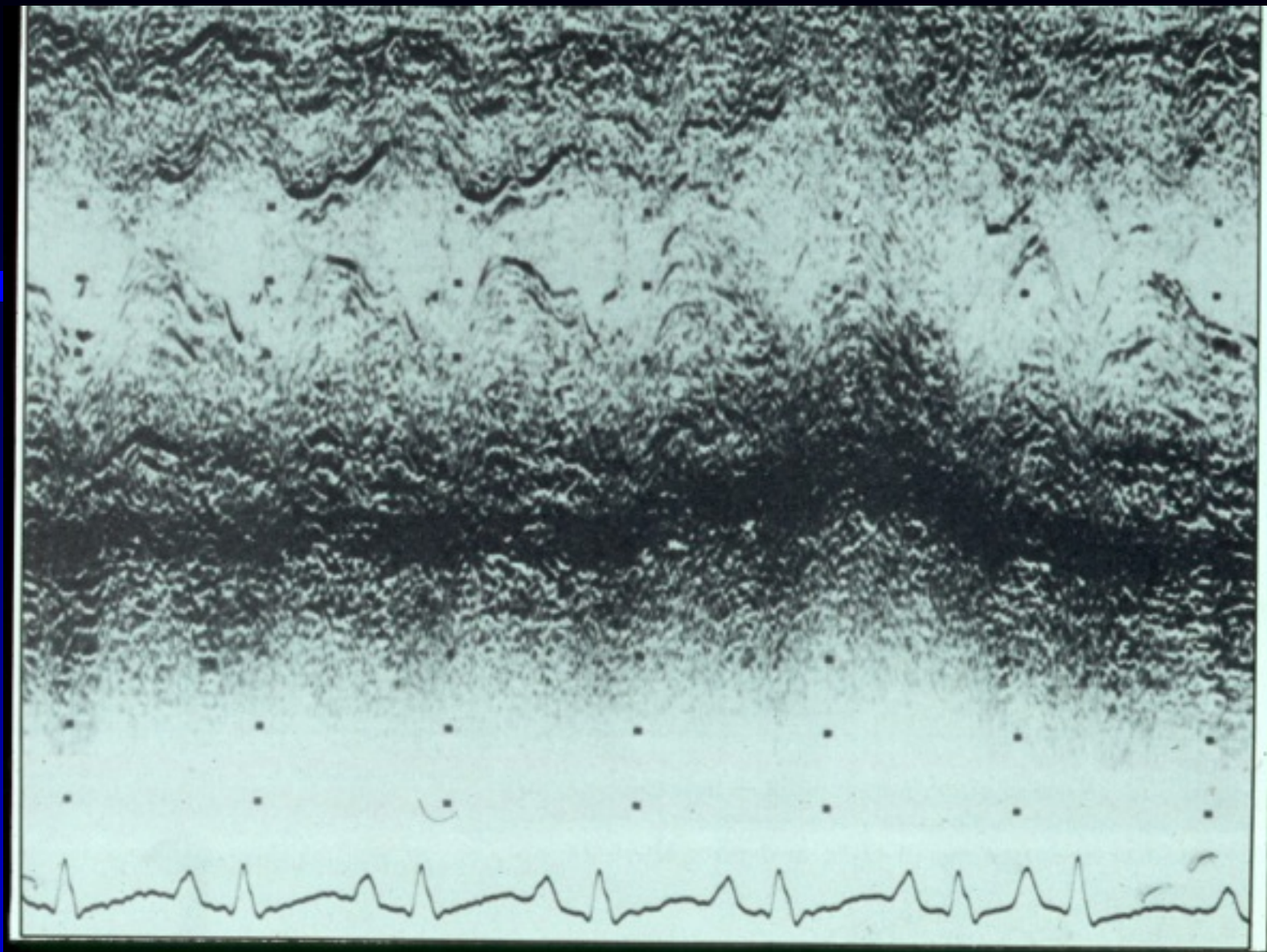
- Causative tumors :
  - Melanoma
  - Hodgkin's lymphoma
  - Acute leukemia
  - Lung ca
  - Breast ca
  - Ovarian ca
- Radiation pericarditis
- Rare to be initial presentation of malignancy

# Malignant Pericardial Tamponade

- **Sx and Signs :**
  - **Dyspnea / weakness +/- chest pain**
  - **Hypotension / narrow pulse pressure**
  - **Friction rub rare**
  - **Jugular venous distention**
  - **Muffled (decreased) heart tones**
  - **Pulsus paradoxicus > 10 mm Hg**
  - **Low EKG QRS voltage +/- pulsus alternans**
  - **+/- cardiomegaly on CXR**

# Malignant Pericardial Tamponade

- **Dx :**
  - Echocardiography
  - Equalization of heart chamber pressures
- **Rx options :**
  - Needle catheter pericardiocentesis
  - Pericardial window under local anesthesia
  - Radiation Rx
  - Pericardiectomy
  - Intrapericardial chemoRx or sclerosis



Septum

Posterior  
ventricular wall

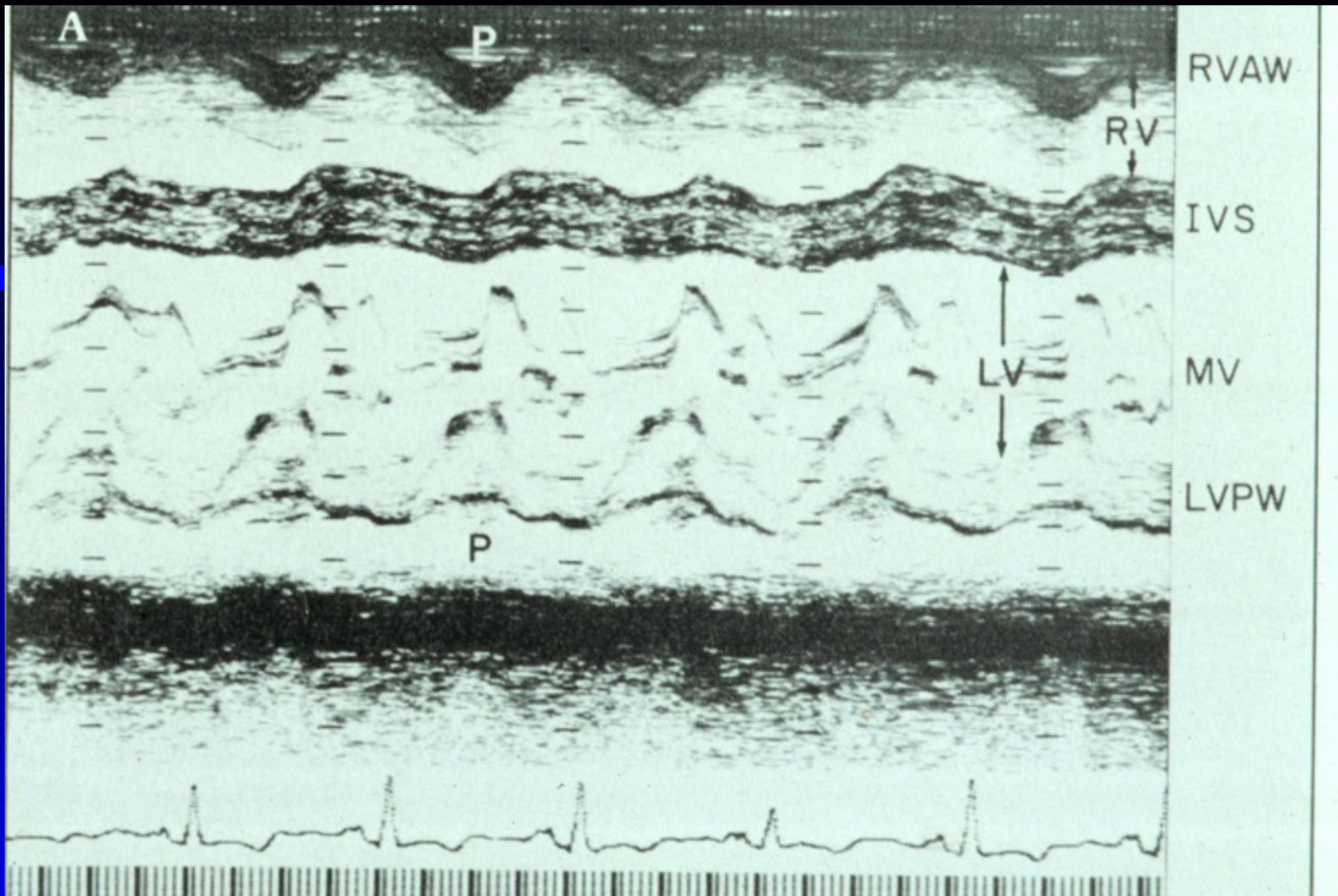
Pericardial  
effusion

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Source Undetermined

**M mode echocardiogram showing malignant pericardial effusion**

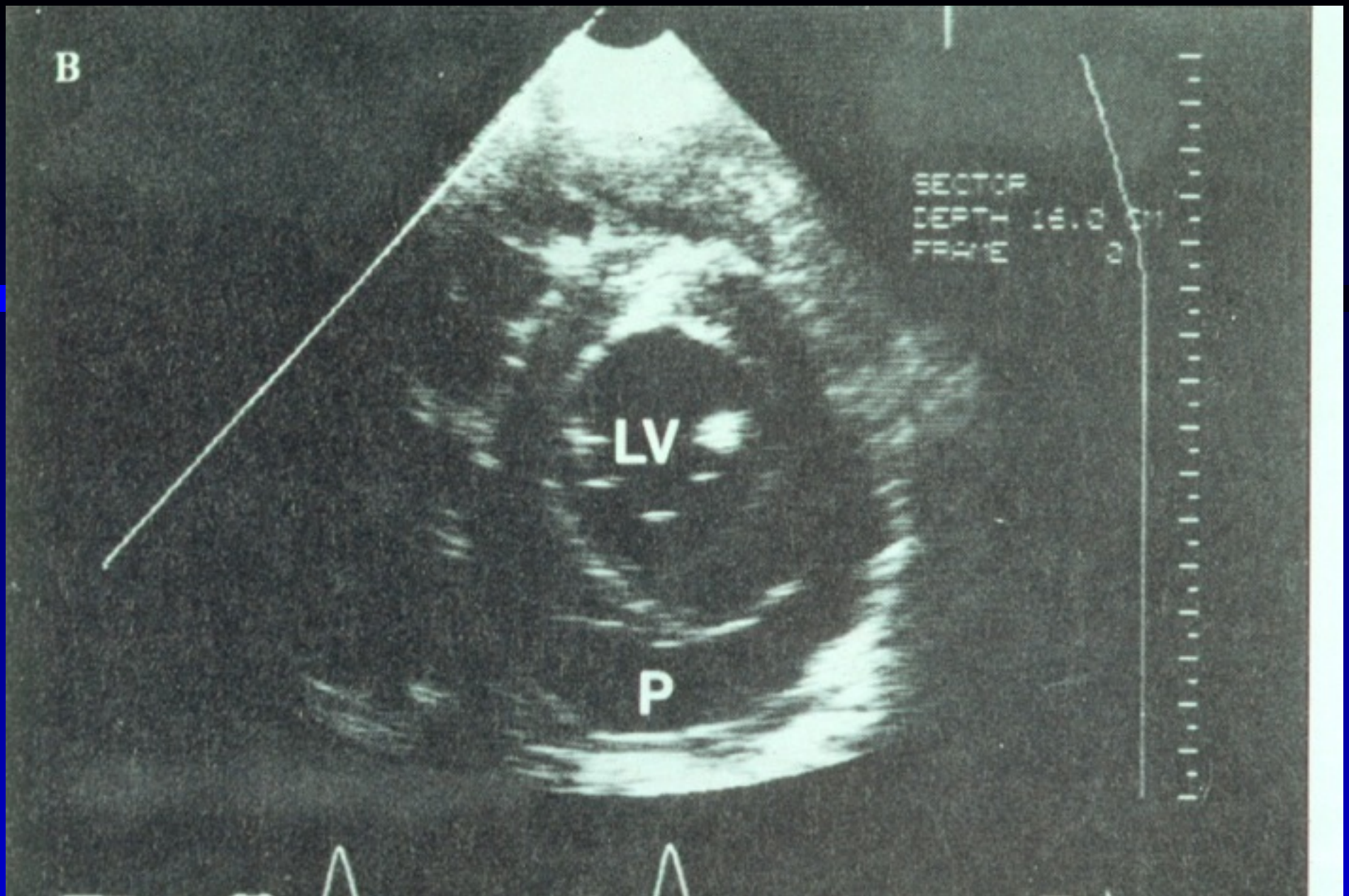




PD-INEL Source Undetermined

**M mode echo showing moderate size pericardial effusion (P)**





PD-INEL

Source Undetermined

**Two dimensional echo in same patient showing pericardial effusion (P)**



# Superior Vena Cava (SVC) Syndrome

- **Causative tumors :**
  - Small cell (oat cell) lung ca
  - Squamous cell lung ca
  - Lymphoma
  - Anaplastic mediastinal ca
- **SVC thrombosis from indwelling catheter**
- **Sx are due to SVC compression or occlusion**

# SVC Syndrome

SYMPTOM	FREQUENCY (%)
Dyspnea	83
Cough	70
Orthopnea	64
Nasal congestion	35
Hoarseness	35
Stridor	33
Dizziness	29
Stupor / coma	20

Other sx : syncope, headache, dysphagia, epistaxis

# SVC Syndrome

<b>SIGN</b>	<b>FREQUENCY (%)</b>
<b>Neck vein distention</b>	<b>92</b>
<b>Facial swelling / fullness</b>	<b>86</b>
<b>Arm vein distention</b>	<b>68</b>
<b>Mentation changes</b>	<b>27</b>
<b>Tongue edema</b>	<b>24</b>
<b>Laryngeal edema</b>	<b>24</b>
<b>Rhinorrhea</b>	<b>18</b>

# SVC Syndrome

- **Less common signs :**
  - **Facial plethora / telangiectasia**
  - **Supraclavicular palpable mass**
  - **Horner's syndrome**
  - **Papilledema**
    - **If present, represents a true emergency**



**Patient with SVC Syndrome**



EMAHkempny, [Wikimedia Commons](#)

**Another patient with SVC Syndrome**





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Source Undetermined

**SVC Syndrome from small cell lung cancer**





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Source Undetermined

**SVC Syndrome from lung adenocarcinoma**

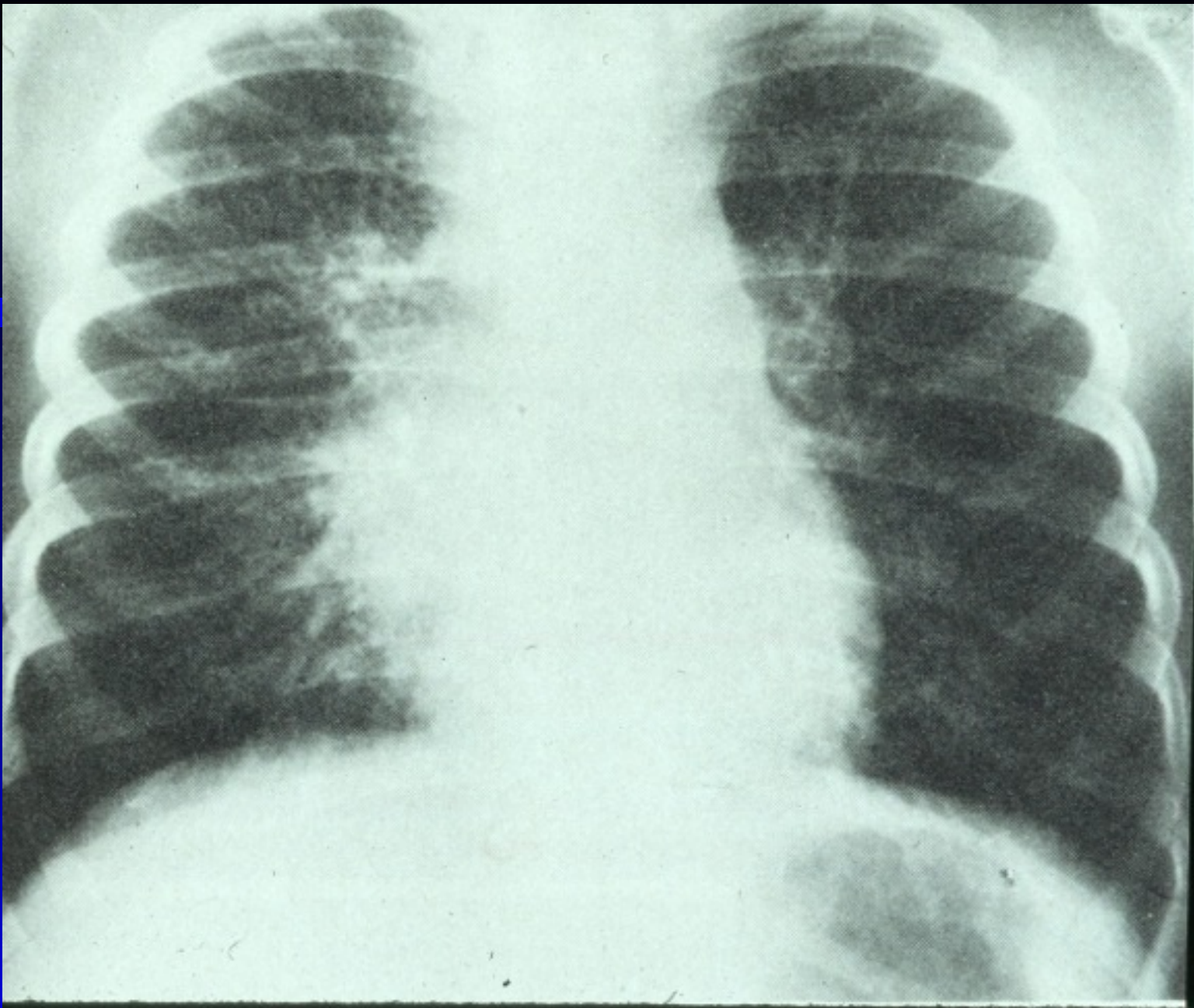


# **SVC Syndrome**

- **Diagnosis**
  - **CXR abnormal in 84 %**
  - **Confirm with (one of ) :**
    - **Chest CT with contrast**
    - **MRI**
    - **Contrast venography**
    - **Tc99m radionuclide venography**



**Anaplastic cancer of the  
mediastinum causing SVC  
Syndrome**

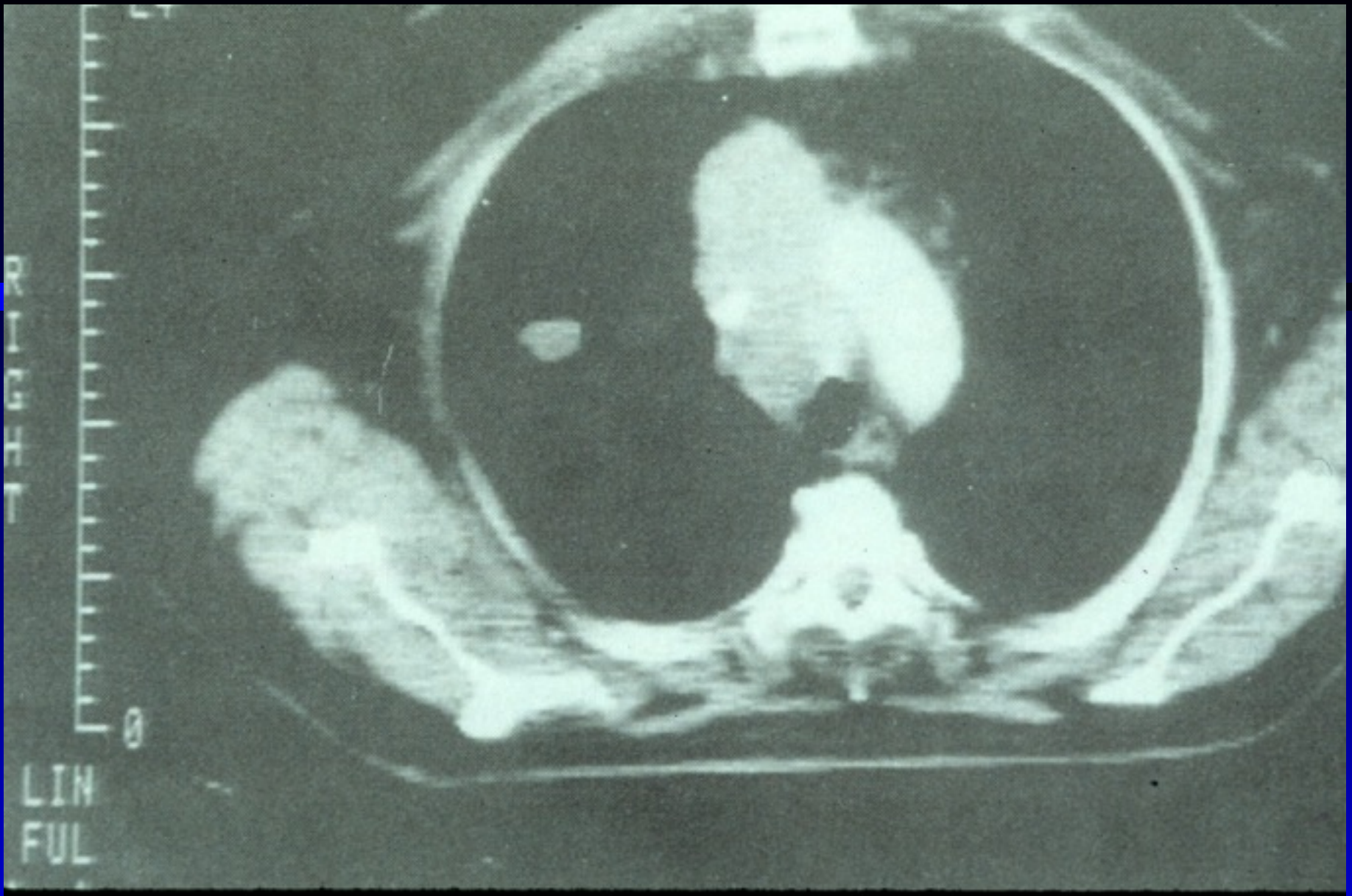


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**Mediastinal widening and pulmonary venous obstruction from lung cancer**





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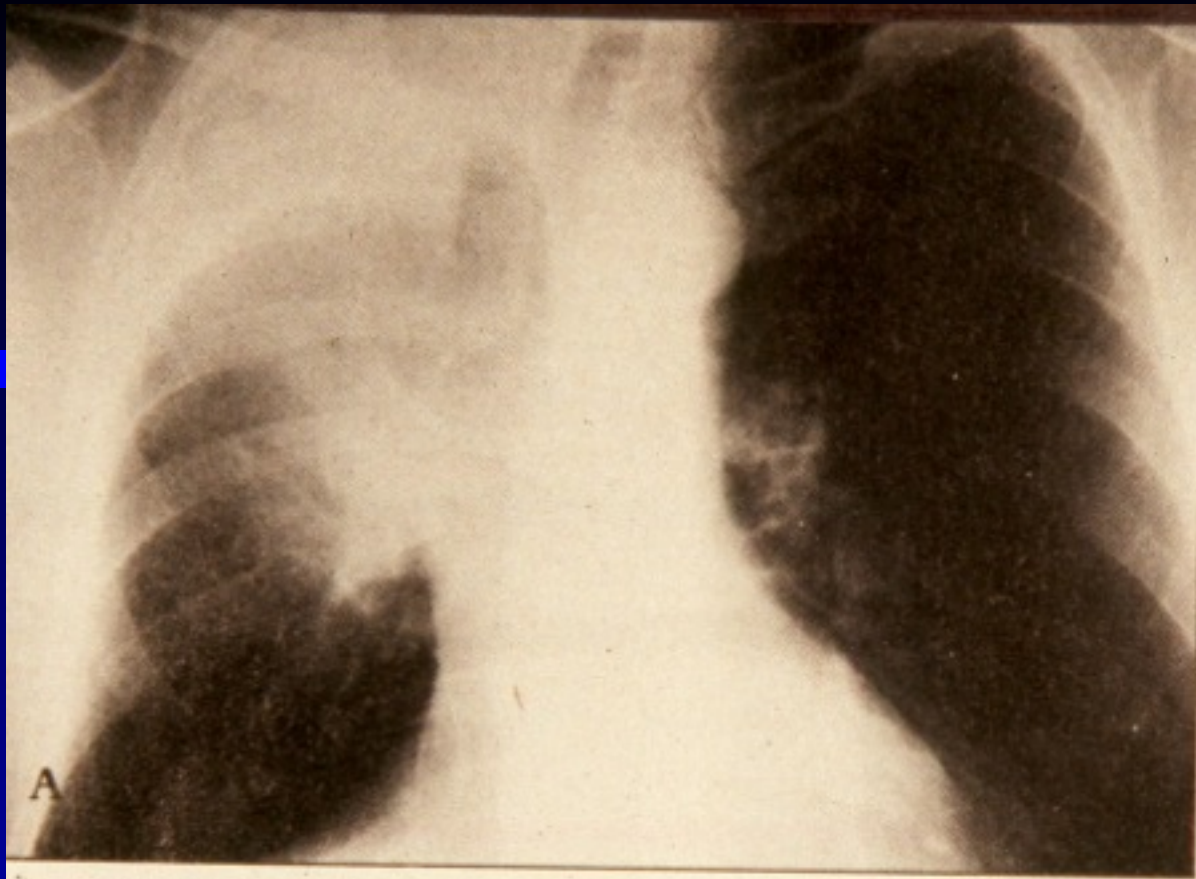
**Chest computed tomography showing right sided mediastinal lung cancer compressing the contrast filled SVC**



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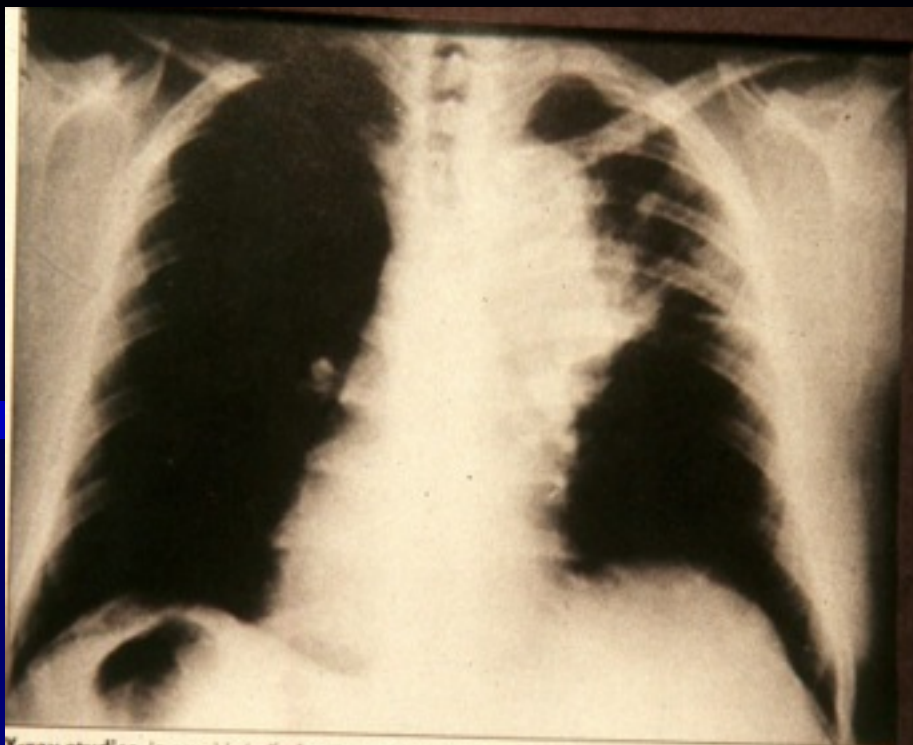
**Another CT cut of the same patient showing tumor compression of the SVC**





**Figure 2**—Right hilar mass producing SVC obstruction (A).  
 Venogram (B) shows extrinsic compression of the SVC.





**X-ray studies.** In roughly half of patients with superior vena cava syndrome due to solid tumors, chest X-ray reveals a mediastinal or pulmonary mass, such as the right hilar mediastinal mass demonstrated here.



**Radionuclide venography.** Radionuclide venography in a patient with superior vena cava syndrome can demonstrate obstruction in the central circulation, but unlike CT scanning, it does not identify the cause. In this instance, the left image shows a normal venogram, and the right image shows a venogram with significant obstruction.



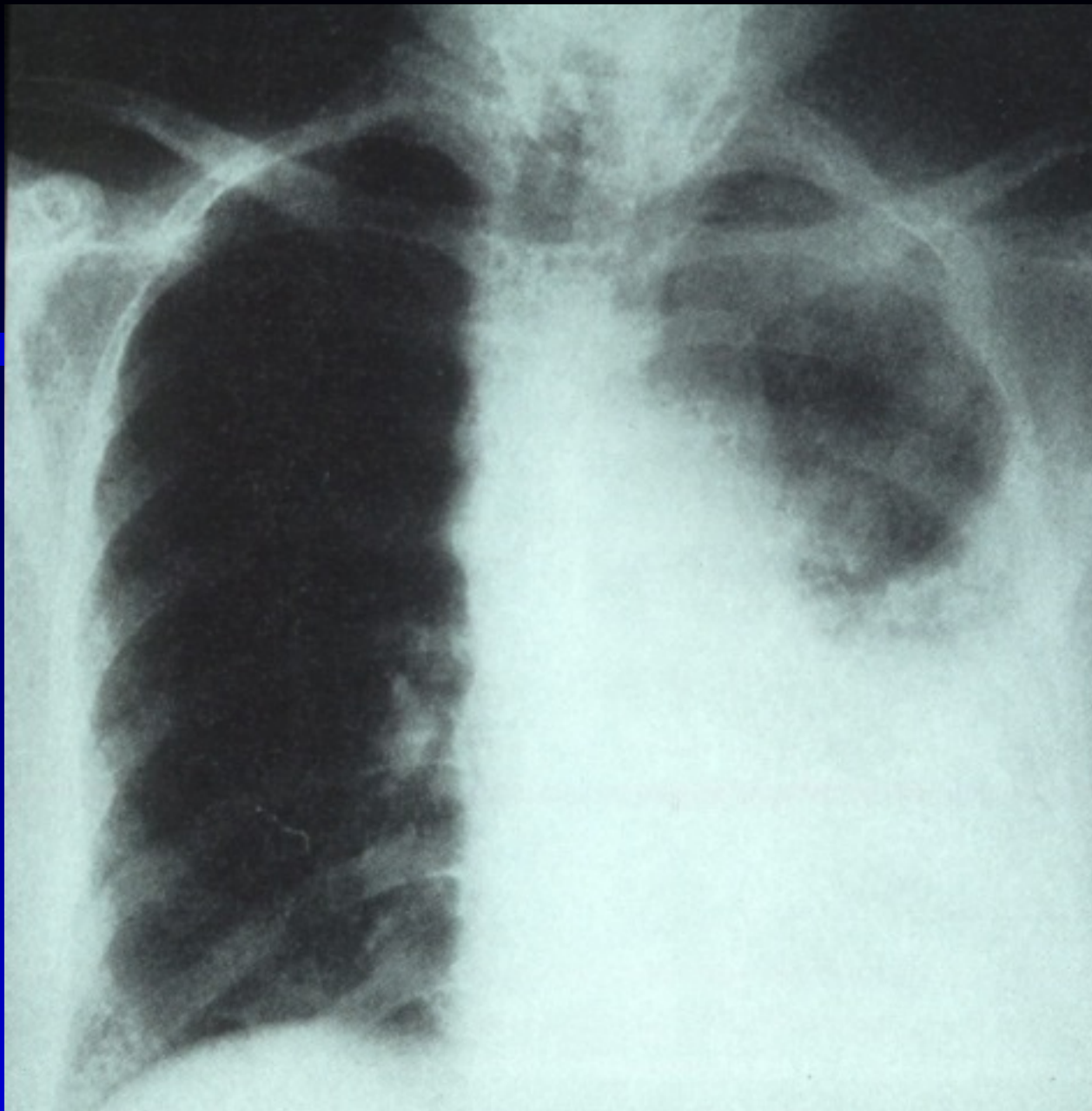


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Source Undetermined

**37 year old male who presented with sudden onset of venous stasis, hoarseness, and hemoptysis**





PD-INEL

Source Undetermined

**Chest X-ray of same patient who proved to have squamous cell cancer of the lung blocking the left subclavian vein**

# SVC Syndrome

- **Treatment :**
  - **Keep in head-up position**
  - **IV steroids**
  - **IV diuretics**
  - **? anticoagulants or thrombolytics**
  - **Emergent mediastinal radiation Rx**
  - **Remove central IV catheter if present**

# Acute Spinal Cord Compression

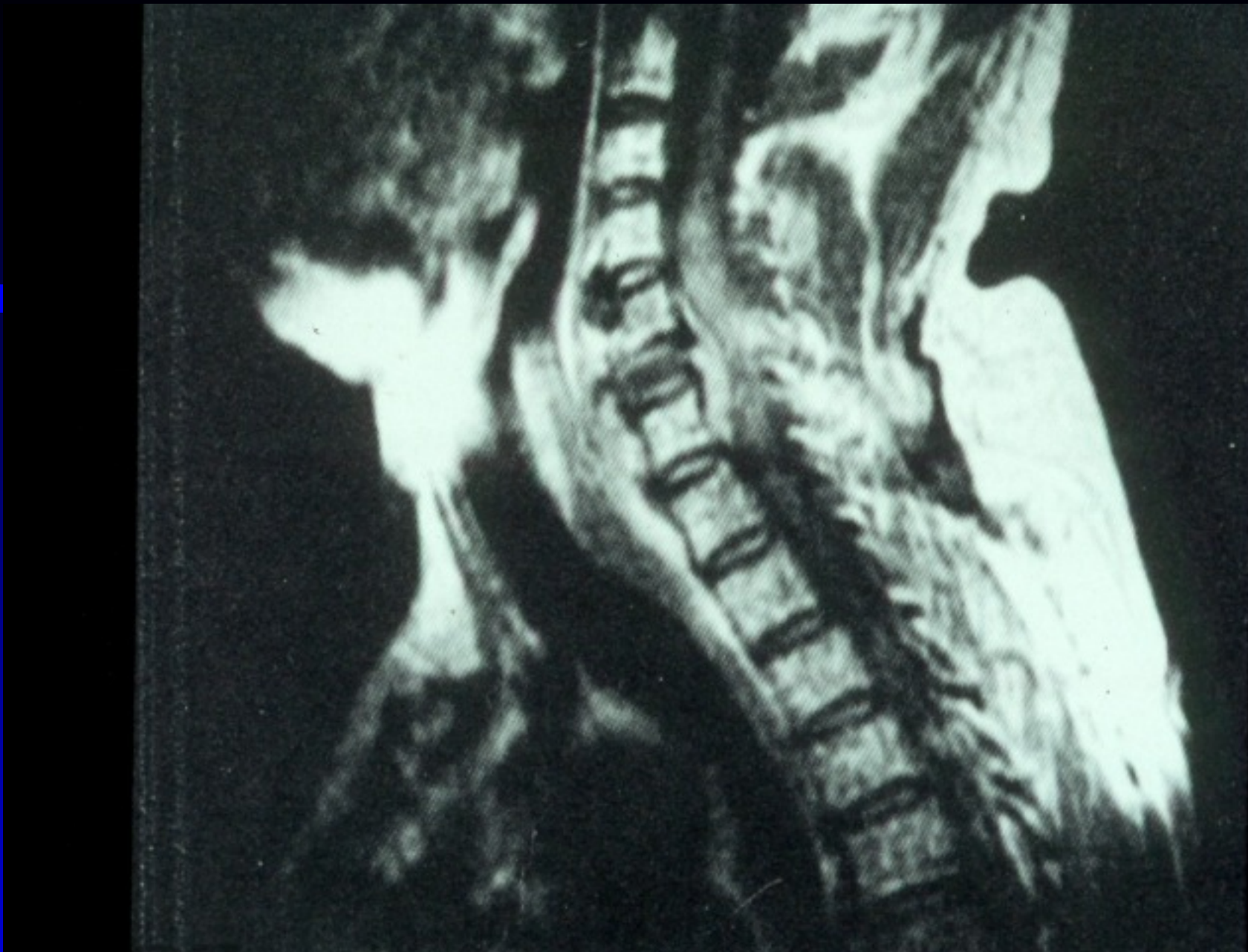
- Causative tumors :
  - Breast ca
  - Lung ca
  - Prostate ca
  - Lymphomas
  - Multiple myeloma
  - Renal cell ca
  - Sarcomas
- Epidural abscess / hematoma
- 18,000 cases per year in U.S.

# Acute Spinal Cord Compression

- **Symptoms :**
  - **Localized back pain +/- tenderness**
    - **May be absent with lymphomas**
  - **Paraparesis / paraplegia**
  - **Distal sensory deficits**
  - **Urinary incontinence**

# Acute Spinal Cord Compression

- **Cervical, thoracic, or lumbar spine films : 85 % abnormal**
  - **May not be needed if CT or MRI planned anyway**
- **Radionuclide bone scan**
  - **Sensitivity > 90 % except for multiple myeloma**
- **Spine CT with contrast**
- **MRI**
- **Myelography**
- **NOTE : any studies done should be in emergent time frame & with early involvement of consultant**



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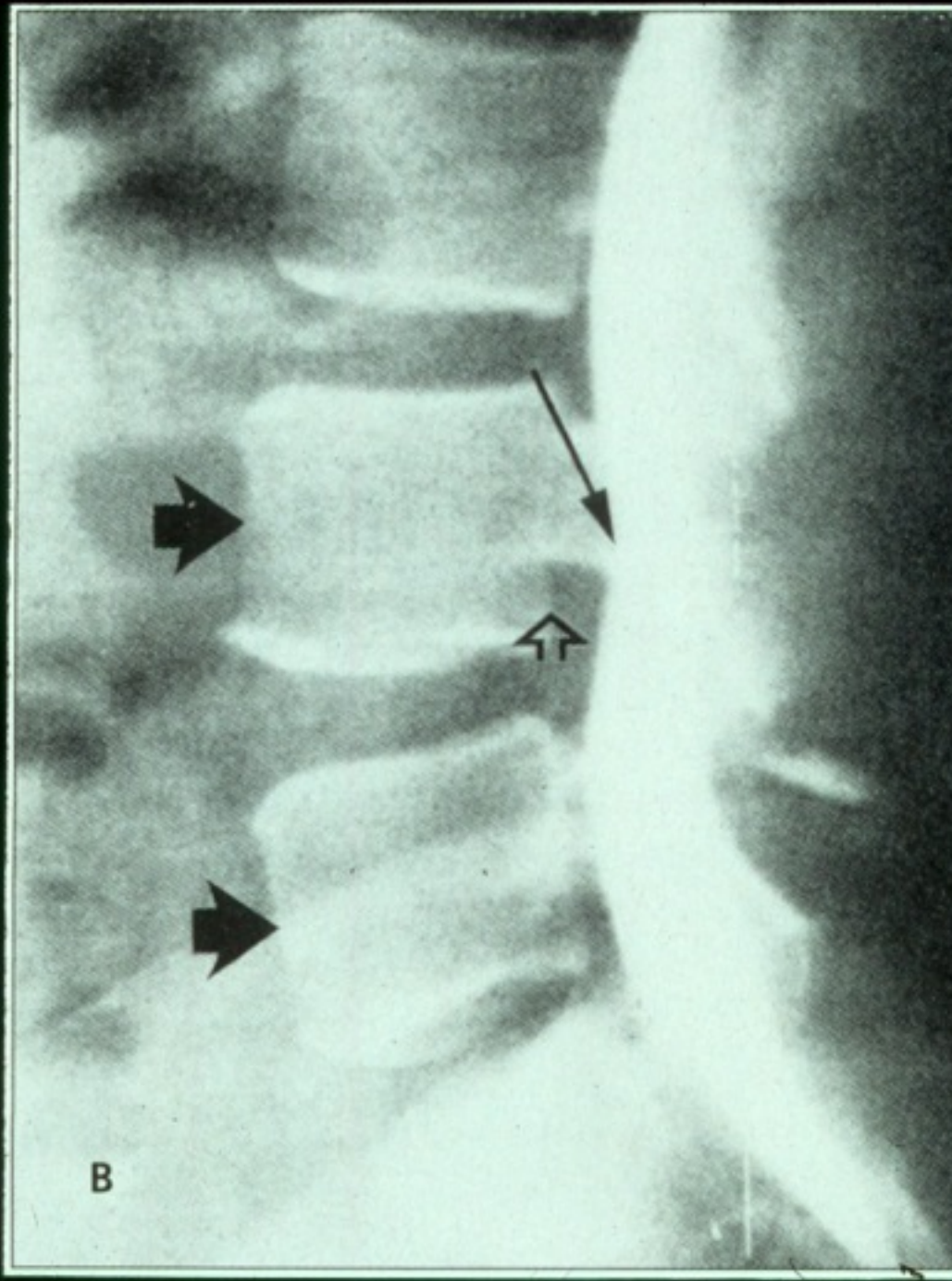
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**MRI scan showing multiple myeloma destroying the C6 vertebra and surrounding the spinal cord**





**40 year old male who presented with neck pain ; he had a metastatic hypernephroma which destroyed the odontoid**



**Myelogram showing breast cancer metastasis pressing on the L5 nerve root, and also pushing the thecal sac posteriorly at L4**





PD-INEL

Source Undetermined

**T1 MRI of same patient showing compression of the L5 nerve root**

# Acute Spinal Cord Compression

- **Treatment**
  - **Spine immobilization**
  - **Foley catheter**
  - **? IV steroids / diuretic / mannitol**
  - **Emergent decompressive laminectomy or radiation Rx**

# Hypercalcemia of Malignancy

- **Causative tumors**
  - **Metastatic breast, lung, or prostate ca**
  - **Multiple myeloma**
  - **Non-Hodgkin's lymphoma**
  - **Adult T-cell lymphoma / leukemia**
  - **Renal cell ca**
  - **Head & neck squamous cell ca**

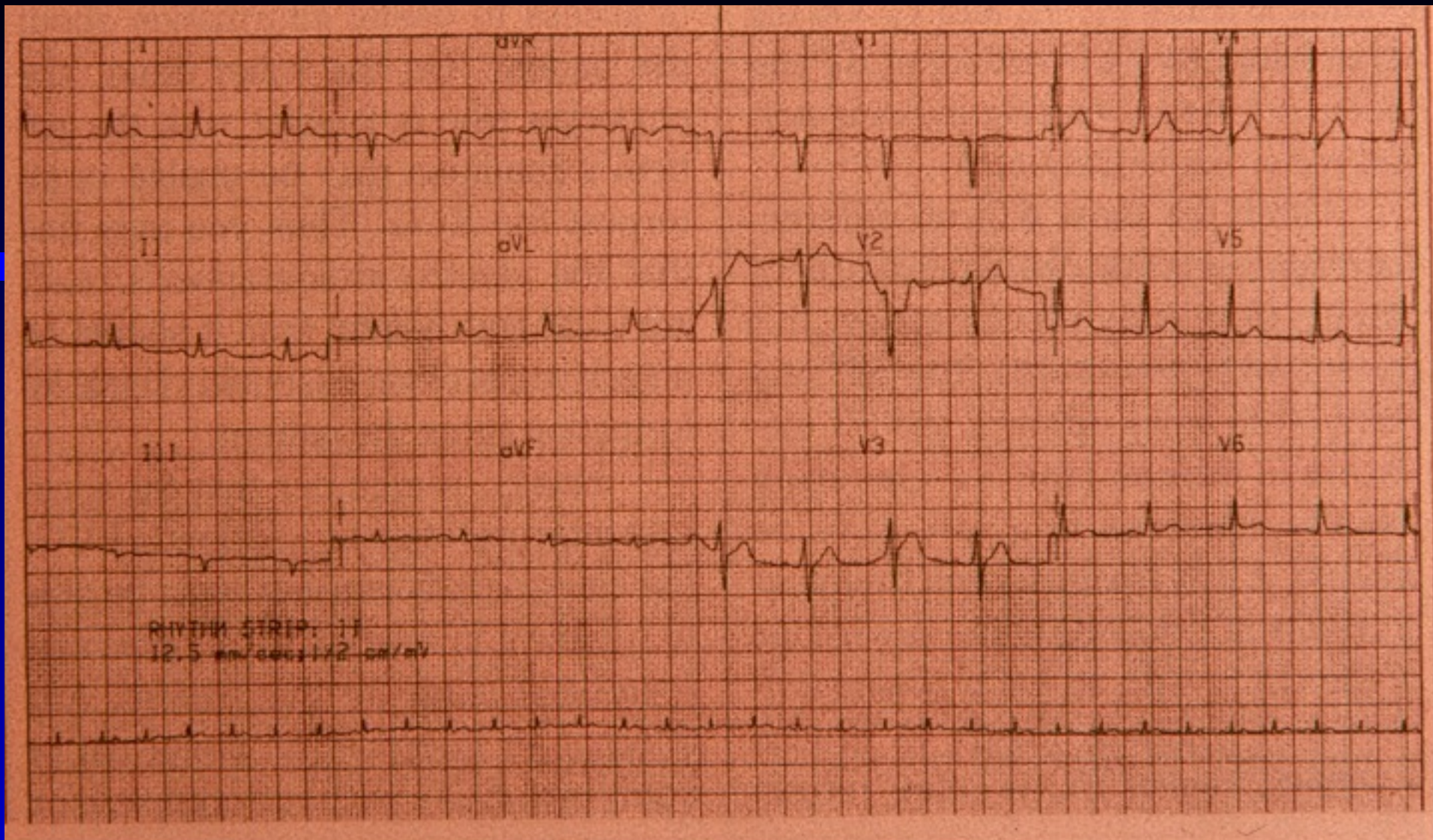
# Malignancy Hypercalcemia

- **Symptoms**
  - Vague malaise / weakness
  - Polydipsia
  - Lethargy / confusion
  - Constipation
  - Vomiting
  - Back pain
  - Can have coma or seizures

# Malignancy Hypercalcemia

- **Diagnosis**
  - Total & ionized serum calcium
  - Serum albumin sometimes helpful
  - EKG shows short QT interval
    - May show low voltage, long PR
  - Discrete skeletal lesions not demonstrable in 30 % of patients
- Serum levels > 12 mg % dangerous





PD-INEL

Source Undetermined

**EKG showing short QT interval (0.28 seconds) in a patient with a serum calcium of 14 mg/dl**

# **Malignancy Hypercalcemia Treatment**

- **IV hydration with normal saline**
- **Diuresis with IV furosemide**
  - **Only after fluid loading ; avoid thiazides**
- **IV steroids**
- **Etidronate (7.5 mg/kg/day IV for 3 days)**
- **Mithramycin (15 to 25 mcg/kg/day IV x 3 days)**
- **Radiation Rx to tumor site(s)**
- **Rarely may need hemodialysis**

# Considerations for Use of Etidronate (Didronel) for Rx of Malignant Hypercalcemia

- Acts mainly to reduce bone resorption
- Mainly excreted renally
- Causes some degree of hyperphosphatemia
- Should be withheld if creatinine  $> 5 \text{ mg \%}$
- Dose (must be diluted in 250 cc NS) :
  - 7.5 mg/kg/day IV for 3 days
  - Dose should be given over 2 hours
- Followup Rx with oral tablets
  - 20 mg/kg/day for 30 days

# Use of Mithramycin (Plicamycin) for Rx of Malignancy Hypercalcemia

- Acts as antineoplastic agent
- Method of action on hypercalcemia not known
- Main complication is bleeding
- GI side effects common
- Can cause thrombocytopenia
- Most useful as second agent for cases not responsive to etidronate



# Hyperviscosity Syndrome

- Basic cause is elevation of serum proteins producing sludging & reduction in microcirculatory perfusion
- Serum viscosity is normally 1.4 to 1.8 times that of water
- Symptoms develop at viscosity  $> 5$

# Hyperviscosity Syndrome

- **Causative tumors**
  - **Multiple myeloma**
  - **Waldenstrom's macroglobulinemia**
  - **Chronic myelocytic leukemia**

# Hyperviscosity Syndrome

## Symptoms

- Fatigue / malaise
- Headache
- Anorexia
- Somnolence
- If microthromboses occur :
  - Deafness
  - Visual deficits
  - Seizures

# **Hyperviscosity Syndrome**

## **Diagnosis**

- **Anemia**
- **Rouleaux formation on peripheral blood smear**
- **Retinal hemorrhages / exudates**
- **"Sausage-link" appearance of retinal vessels**
- **Factitious hyponatremia (due to H<sub>2</sub>O displacement)**
- **Measurement of serum viscosity & serum protein electrophoresis (SPEP) confirm Dx**



# Hyperviscosity Syndrome Treatment

- If comatose :
  - Emergent 2 unit phlebotomy & saline infusion
- Rehydration with IV saline
- Emergency plasmapheresis
- If patient has CML & massive leucocytosis : leukopheresis & concurrent chemoRx

# Hyperleukocytic Syndrome

- Usually occurs in new onset acute myelocytic leukemia
- Can occur in CML with blast crisis
- WBC  $> 100$  k in AML is dangerous
- WBC  $> 250$  k in CML is dangerous
- Myeloblasts invade & damage vessel walls, esp. in brain & lung
- Serum analyses show pseudohypoxia, pseudohyperkalemia, & pseudohypoglycemia

# Hyperleukocytic Syndrome

- **Symptoms**
  - **Marked dyspnea**
  - **Headache, confusion**
- **Signs**
  - **Hypoxia**
  - **Diffuse lung infiltrates**
  - **Neuro deficits**

# Hyperleukocytic Syndrome Treatment

- Temporizing with leukopheresis
- Load with allopurinol (600 mg/M<sup>2</sup>)
- Then give hydroxyurea 3 to 5 gm/M<sup>2</sup>
- Brain radiation Rx for CNS leukostasis
- Definitive chemoRx once WBC decreased



# Acute Tumor Lysis Syndrome

- Usually occurs 6 to 72 hours after initiation of chemoRx or radiation Rx
- Due to rapid release of cell contents into bloodstream
- Most common tumor causes :
  - Leukemias (with high WBC counts)
  - Lymphomas
  - Small cell ca
  - Metastatic adenoca

# **Acute Tumor Lysis Syndrome**

## **Etiologic Factors**

- **Large tumor burden**
- **High growth fraction**
- **High preRx serum LDH or uric acid**
- **Preexisting renal insufficiency**

# Acute Tumor Lysis Syndrome

- **Main life-threatening problems :**
  - **Hyperkalemia**
  - **Hyperuricemia (causes uric acid nephropathy)**
  - **Hyperphosphatemia with secondary hypocalcemia**
- **Can result in acute renal failure & arrhythmias**

# Acute Tumor Lysis Syndrome

## Treatment

- Stop the chemoRx
- Aggressive IV hydration / diuresis
- +/- alkalinize urine to pH 7
  - Decreases urate but may worsen hypocalcemic tetany
- $\text{CaCl}_2$ ,  $\text{NaHCO}_3$ , glucose / insulin, kayexalate for hyperkalemia
- Emergency hemodialysis
  - If  $\text{K} > 6$ , urate  $> 10$ , creat.  $> 10$ , or unable to tolerate diuresis
- Can use allopurinol for prevention

# Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH)

- **Causative tumors :**
  - Small cell lung ca most common (ectopic ADH)
  - Pancreatic ca
  - Bowel ca
  - Thymus ca
  - Prostate ca
  - Lymphosarcoma
  - Any brain tumor
- Vincristine or cyclophosphamide
- Other meds (narcotics, phenothiazines, etc.)



# SIADH

## Symptoms

- **Altered mental status**
  - lethargy
  - confusion
- **Anorexia, nausea, vomiting**
- **Peripheral edema**
- **If severe, coma or seizures**

# **SIADH**

## **Diagnosis**

- **Normal renal, thyroid, adrenal, & cardiac function**
- **Absence of diuretic Rx**
- **Euvolemia or hypervolemia**
- **Hyponatremia with less than maximally dilute urine**
- **Excessive urine Na excretion ( $> 30$  meq/liter)**

# SIADH

## Treatment

- Serum Na  $> 125$  usually not require Rx
- Fluid restriction only, if mild
- Furosemide with NS bolus (increases free water clearance)
- Hypertonic saline (3 %) only needed for :
  - seizures
  - coma
  - cardiovascular compromise
- Only correct at about 1 meq/liter/hour (if too fast can cause central pontine myelinolysis)
- Seizure control with benzodiazepines

# **Malignancy - Caused Adrenal Crisis**

- **Causative tumors :**
  - **Melanoma**
  - **Lung ca**
  - **Breast ca**
  - **Renal & other retroperitoneal ca's**
- **Withdrawl of chronic steroid Rx**
- **Infection of adrenals**
- **Adrenal hemorrhage**
- **Aminoglutethamide chemoRx**

# Malignancy - Caused Adrenal Crisis

- Symptoms
  - weakness, lethargy
  - thirst
- Signs
  - Dehydration
  - Hypotension
  - Hyponatremia, hyperkalemia, hypoglycemia, azotemia, +/- eosinophilia



# Malignancy - Caused Adrenal Crisis

- **Diagnosis**
  - Serum electrolytes, BUN
  - Serum cortisol (draw prior to Rx)
  - Computed tomography of retroperitoneum (+/- MRI)
- **Start Rx prior to full workup**

# **Malignancy - Caused Adrenal Crisis**

## **Treatment**

- **IV fluid bolus (NS)**
- **IV steroids (at least 300 mg equivalents of hydrocortisone per day initially)**
- **+/- calcium, NaHCO<sub>3</sub>, glucose / insulin for hyperkalemia**
- **IV glucose**
- **Evaluate for source of infection**
- **Maintain steroid coverage**

# **Hemorrhagic Syndromes in Malignancy \***

- **Thrombocytopenia**
- **Disseminated intravascular coagulation (DIC)**
- **Decreased clotting factors**
- **Primary fibrinolysis**
- **Platelet dysfunction**
- **Vascular defects**
- **Circulating anticoagulants**

(\* in decreasing order of probability)

# Mechanisms of Thrombocytopenia in Malignancy

- ChemoRx
- Radiation Rx
- Bone marrow tumor infiltration
- Hypersplenism
- DIC
- Infection - induced
- ITP

# Thrombocytopenia in Malignancy

- Avoid all NSAID's
- Spontaneous bleeds can occur if platelets  $< 10$  K
- Platelet transfusion indications :
  - count  $< 5000$
  - Any CNS bleed (even if count  $> 10$  k)
  - Avoid in consumptive states
  - Use HLA matched single donor platelets if sensitized



# Malignancy - Related DIC

- Possible with any tumor but usually due to :
  - acute leukemia (esp. promyelocytic)
  - pancreas ca
  - prostate ca
- Can be acute or chronic
  - Acute↓: platelets,↑ PT, PTT, FDP, ↓ fibrinogen
    - Rx with platelets & clotting factors
    - May need tumor debulking
  - Chronic : lab results may be near normal ; Rx intravascular thrombosis with heparin

# Malignancy - Related Primary Fibrinolysis

- Some tumors cause spontaneous fibrinolytic activity :
  - Sarcomas
  - Breast ca
  - Colon ca
  - Gastric ca
  - Thyroid ca
- Show increased FDP's
- Rx with epsilon aminocaproic acid

# Treatment- Related Bleeding Disorders in Malignancy

- Due to specific chemoRx agents :
  - Plicamycin : thrombocytopenia, DIC
  - L-asparaginase : hypofibrinogenemia
  - Mitomycin : microangiopathic hemolytic anemia
  - Actinomycin D : vitamin K antagonist
  - Daunorubicin : primary fibrinolysis
- Initiation of DIC by cytotoxic effects

# **Malignancy - Related Immunosuppression / Infection**

- **Causative tumors**
  - **Almost all**
  - **Also due to chemoRx or radiation Rx directly**
- **If fever & neutrophil plus band count is < 500 per mm<sup>3</sup>, presume serious infection present**
  - **Most common source is endogenous microbes**
  - **Rx with antipseudomonal med plus 3rd generation cephalosporin +/- amphotericin**

# **Oncologic Emergencies Summary**

- **Have low threshold for workup of vague symptoms in the cancer patient**
- **Consider direct effects of meds**
- **Treat complications aggressively if primary tumor still treatable**
- **Have prearranged referral arrangements for special emergent Rx's**