Hematology - Case discussions

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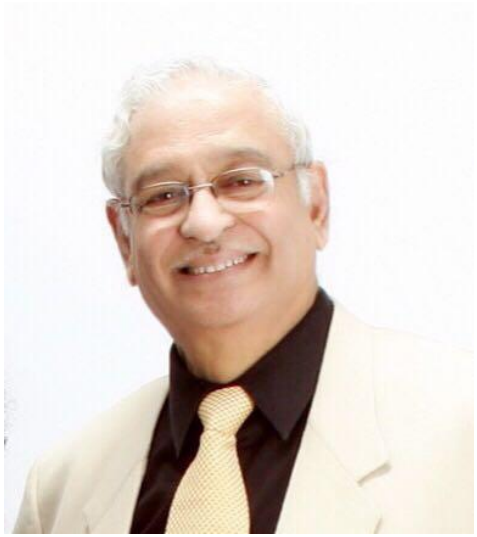


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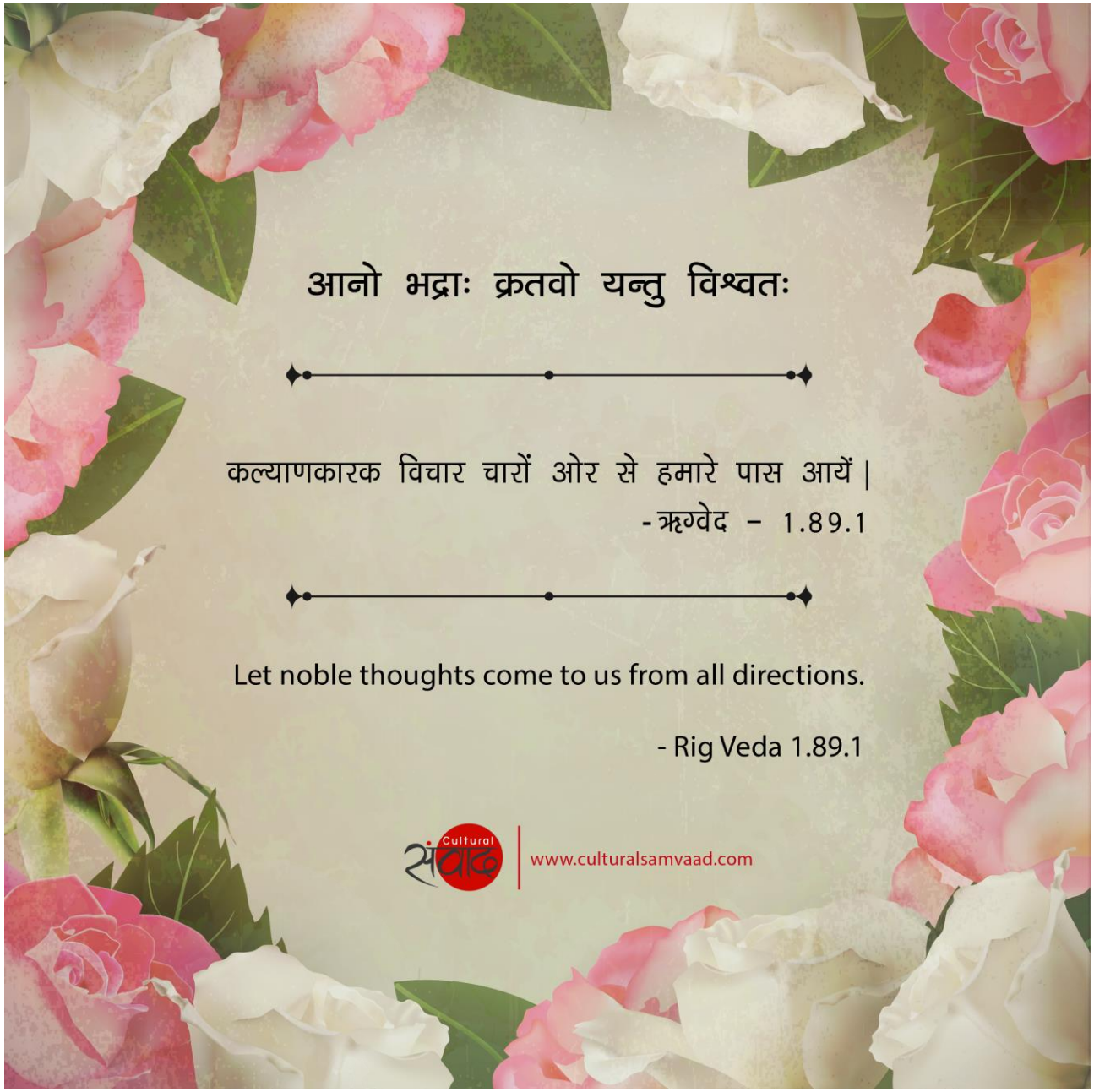
आनो भद्राः क्रतवो यन्तु विश्वतः
कल्याणकारक विचार चारों ओर से हमारे पास आयें |
-ऋग्वेद – 1.89.1
Let noble thoughts come to us from all directions.
- Rig Veda 1.89.1
Cultural संवाद
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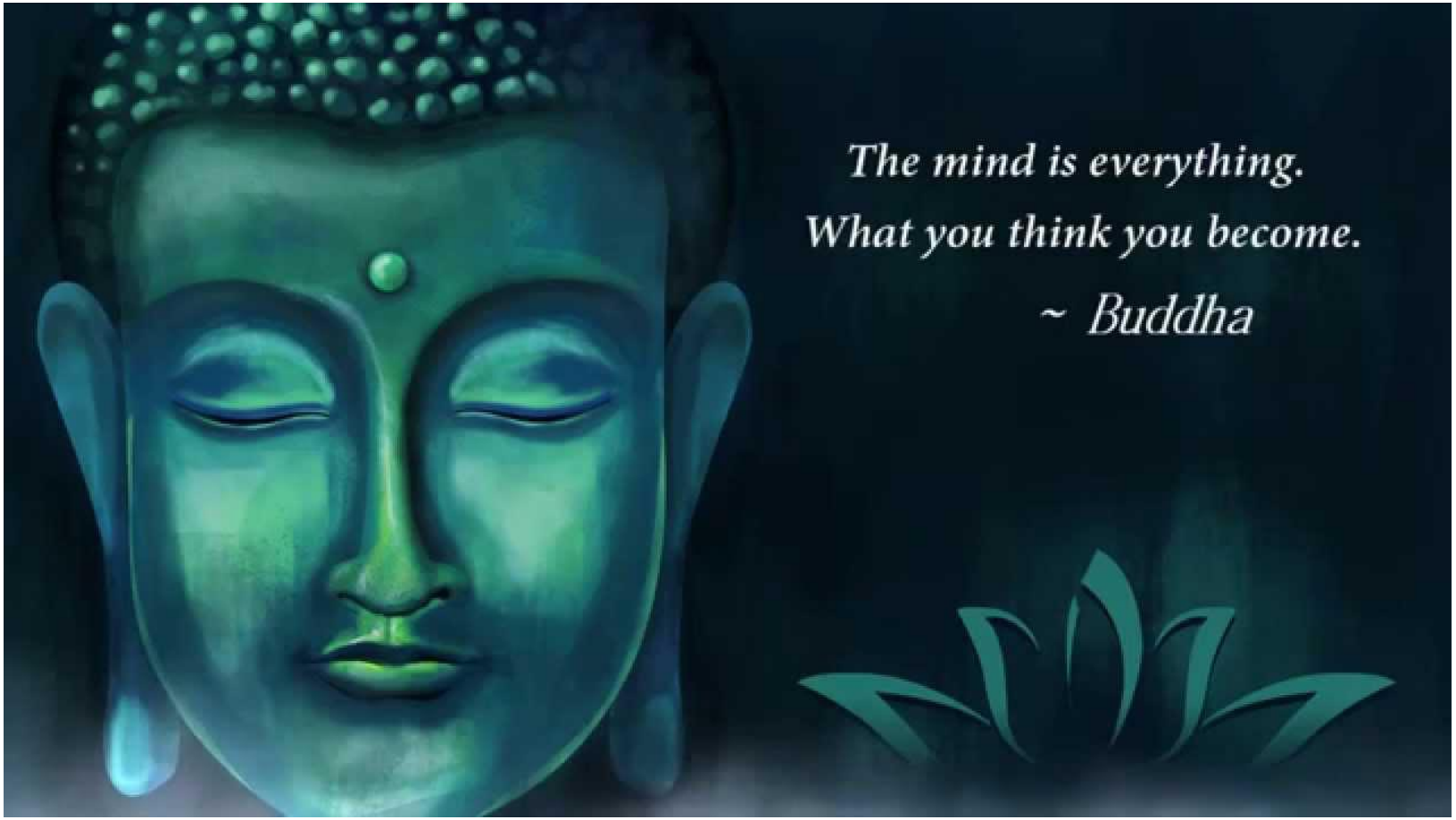
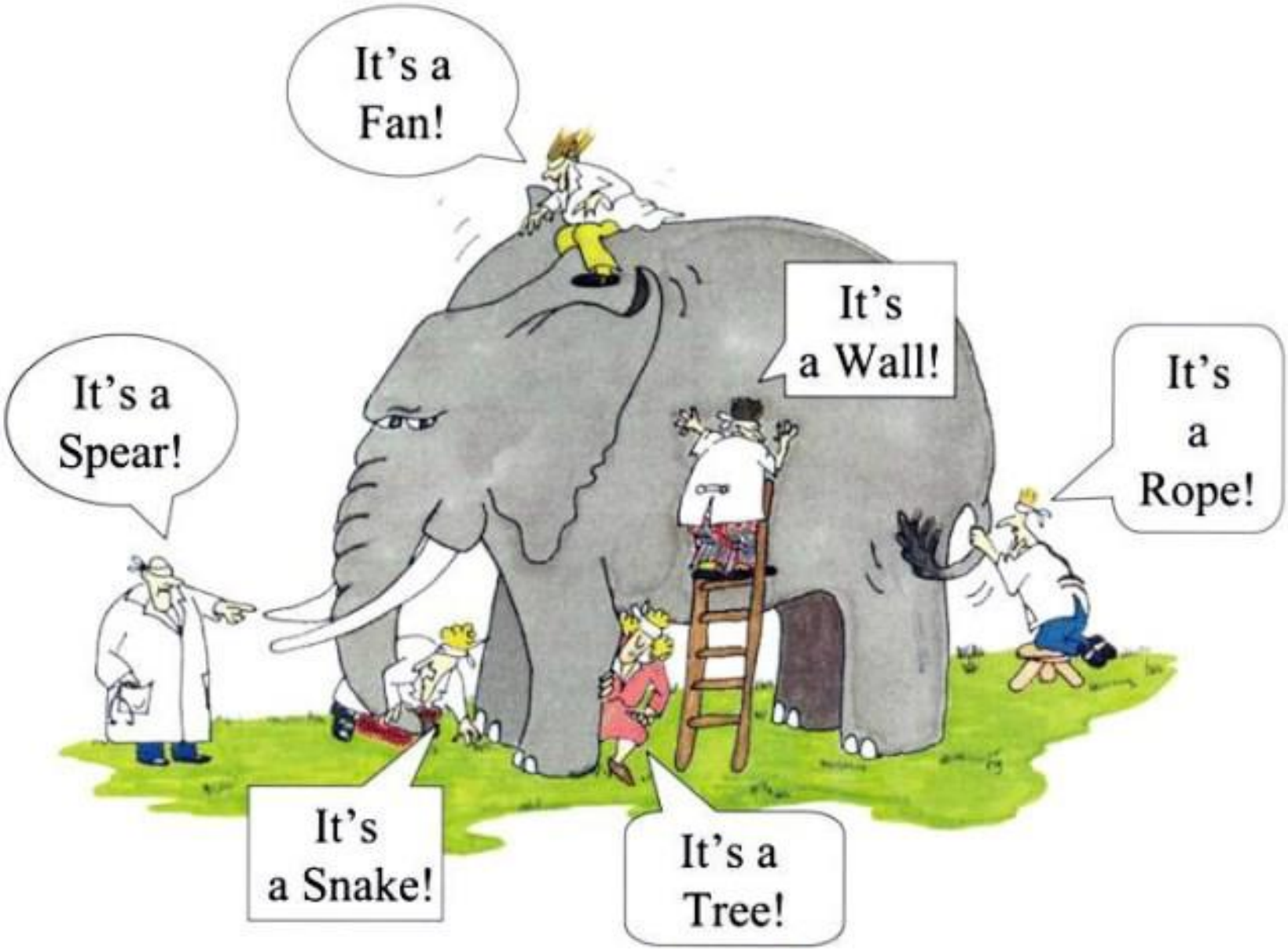
“Every word we read in the subject of medicine should drive away the suffering of every individual we come across”

Please keep mobiles in vibration mode


The mind is everything.
What you think you become.
~ Buddha


It's a Fan!
It's a Spear!
It's a Wall!
It's a Rope!
It's a Snake!
It's a Tree!

Case-1

- 76 year, male with 90% stenosis of RCA, 70% stenosis of LAD
- Underwent Coronary Artery Bypass Graft (CABG)
- Patient received heparin prior to and during surgery, with no documentation of heparin received post-operatively
- No clinical evidence of clotting

Case-1

- Platelet counts:
  - Pre-op: 169 x 1000/µL (150 – 400)
  - Day of surgery: 110
  - POD #1: 104
  - POD #2: 74.7
  - POD #3: 92.2
  - POD #4: 81.5
  - POD #5: 89.8
  - POD #6: 52.3
  - POD #7: 11.3
  - POD #8: 8.86

Case-1

Differential diagnosis:

- **Heparin-induced thrombocytopenia (HIT)**
- **Other drug-induced thrombocytopenia**
- **ITP**
- **DIC**
- **TTP**

Heparin-induced thrombocytopenia (HIT)

Diagnostic criteria :

- **Thrombocytopenia: >50% fall in platelet count**
- **Timing: Days 5-10 after exposure to heparin, or <day 1 with recent heparin exposure (past 30 days)**
- **Thrombosis: Thrombosis precedes thrombocytopenia in up to 25% of patients with HIT**
- **Other causes of platelet fall to be excluded**

Heparin-induced thrombocytopenia (HIT)

- Diagnostic tests -Immunoassays and functional assays
- Immunoassays identify antibodies against heparin/platelet factor 4 (PF4) complexes
- Functional assays measure the platelet-activating capacity of PF4/heparin-antibody complexes(More specific ,not widely available)

- Patient was switched to Argatroban, heparin was discontinued
- Platelet count increased to normal
- No thrombotic events

Case-2

- **Male child with Down syndrome , aged 10 days (Mother age - 38yrs), presented with H/O URTI**
- **Day 1 of admission:**

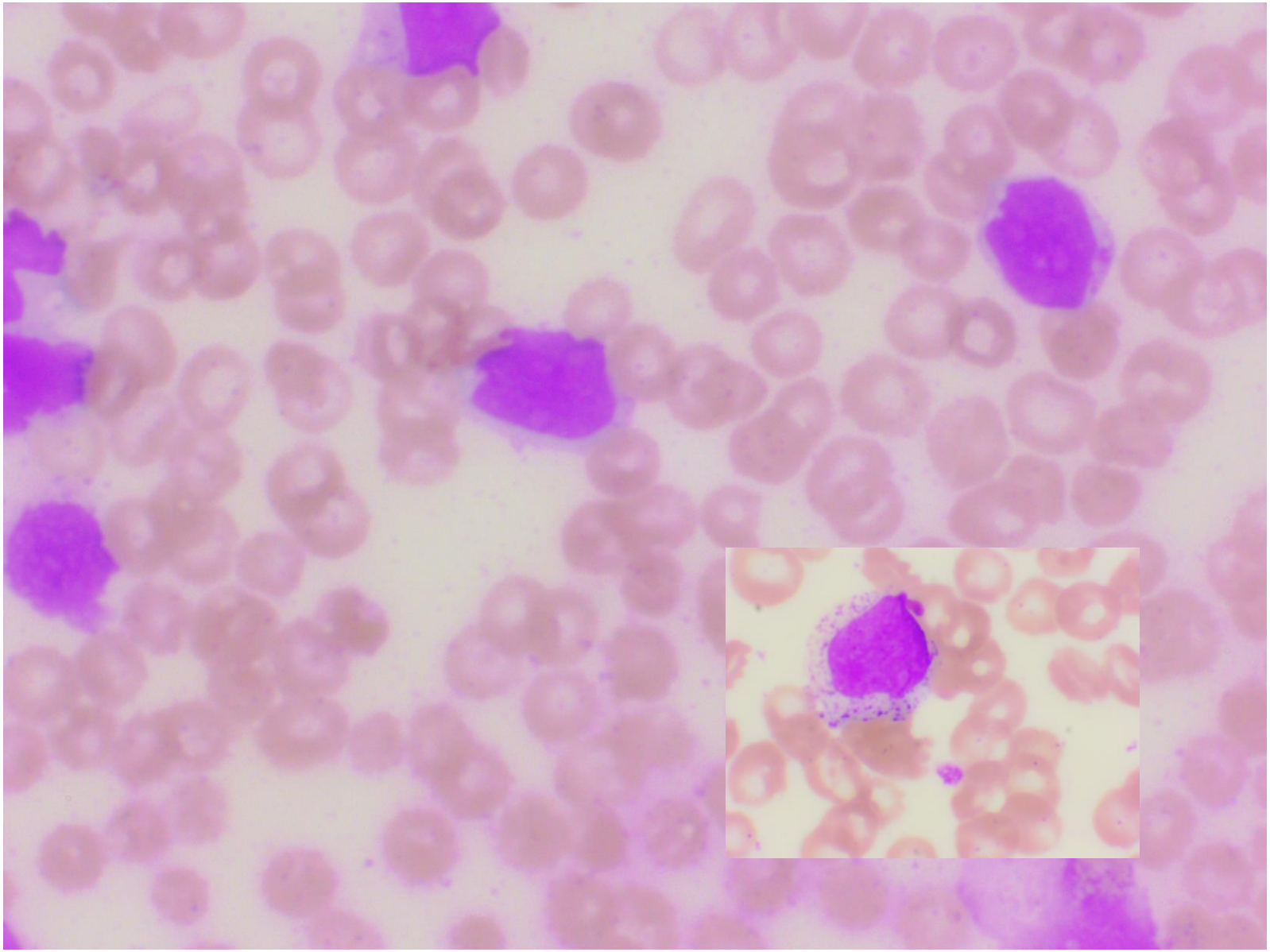
  Hb-17.5 gm% ;

  TLC-1,38,000/cumm ; DLC- 80%Myeloblasts

  Plt-45,000/cumm
- **Only symptomatic treatment given for 2 wks**
- **Day 14 :**

Hb-14.5gm% ;

TLC-41,000/cumm ; DLC-60% Myeloblasts
Plt-82,000/cumm



H-15/19

Transient myeloproliferative disorder(TMD)

- **Neonates with Down syndrome (DS) have a unique predilection to develop transient myeloproliferative disorder (TMD), a rare clonal myeloproliferation characterized by clinical & morphological findings indistinguishable from acute megakaryocytic leukemia (AMKL-FAB M7)**
- **4% to 10% of newborn infants with DS are thought to develop TMD**
- **Resolves spontaneously over a period of several weeks to 3 months**
- **In 20 -30% of cases, non transient AML (acute myeloid leukemia) subsequently develops within 1-3 yrs, of which >50% AMKL**

Leukaemia in Down's Syndrome

- **10-20 fold increased risk of leukaemia**
- ALL
  - 80% childhood leukaemia; 60% Down's Syndrome leukaemia
  - 20 times higher incidence children with Down's Syndrome compared to children without Down's Syndrome
- AML
  - 20% childhood leukaemia; 40% Down's Syndrome leukaemia
- *AMKL*
  - *6% childhood AML; 62% Down's Syndrome AML*
  - *500 times higher incidence children with Down's Syndrome compared to children without Down's Syndrome*

Transient myeloproliferative disorder (TMD)

- **TMD infiltration and damage is restricted to a limited set of organs – liver, heart, marrow, pancreas, and skin. Secondarily impacted are the spleen, lungs, and kidneys (the latter two often an ultimate cause of death)**
- **This in turn, permits clinician a greater ability to provide targeted supportive care**

Transient myeloproliferative disorder-Genetic Profile

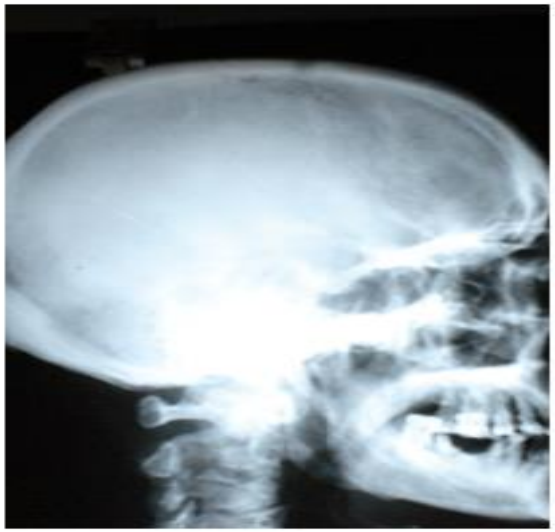
- **Mutations in GATA1 gene in almost all cases (compared to 4% of all Down syndrome infants, Blood 2007;110:2128)**
- **Specific mutations may differ in TMD and subsequent AML-M7 / AMKL (Int J Hematol 2007;86:250)**
- **Loss of GATA1 impairs maturation of megakaryocyte erythroid progenitors (Blood 2006;107:87)**
- **JAK3 mutations found in 50% of cases (Br J Haematol 2007;137:337)**

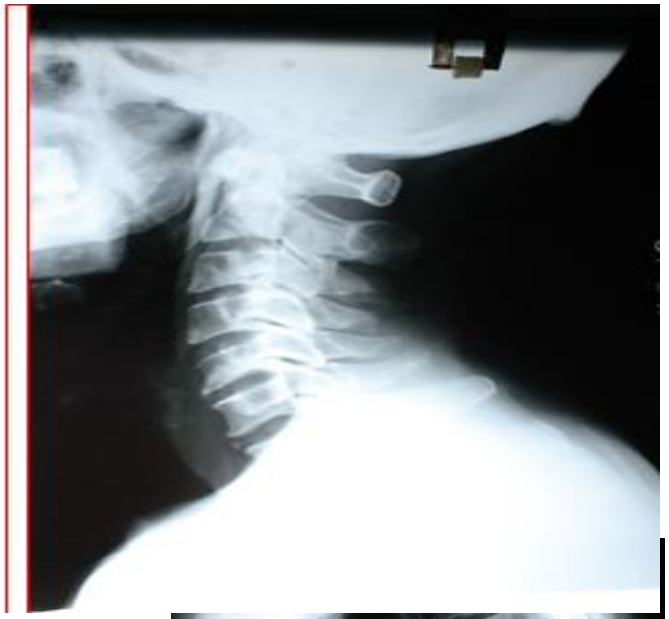
Case-3

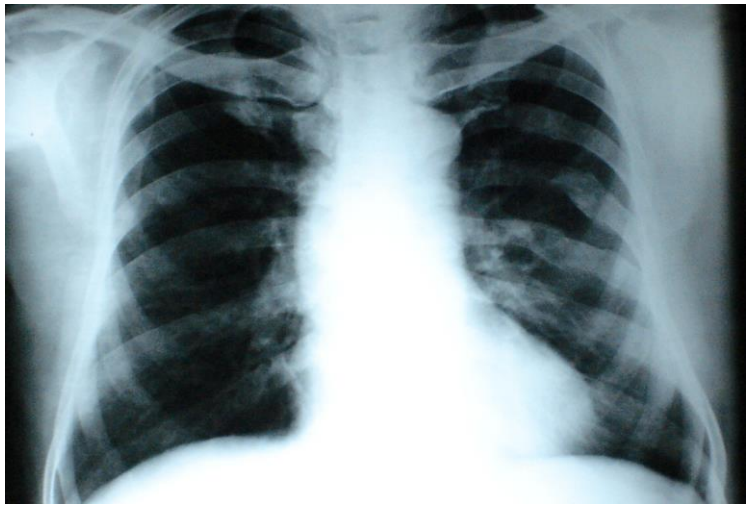
A man aged 75 years presented with

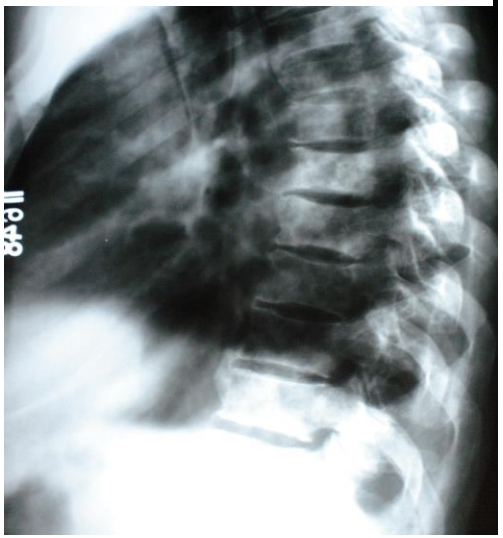
- **H/O spinal pains at multiple levels**
- **Features of myeloradiculopathy**
- **Known Diabetic & Hypertensive**

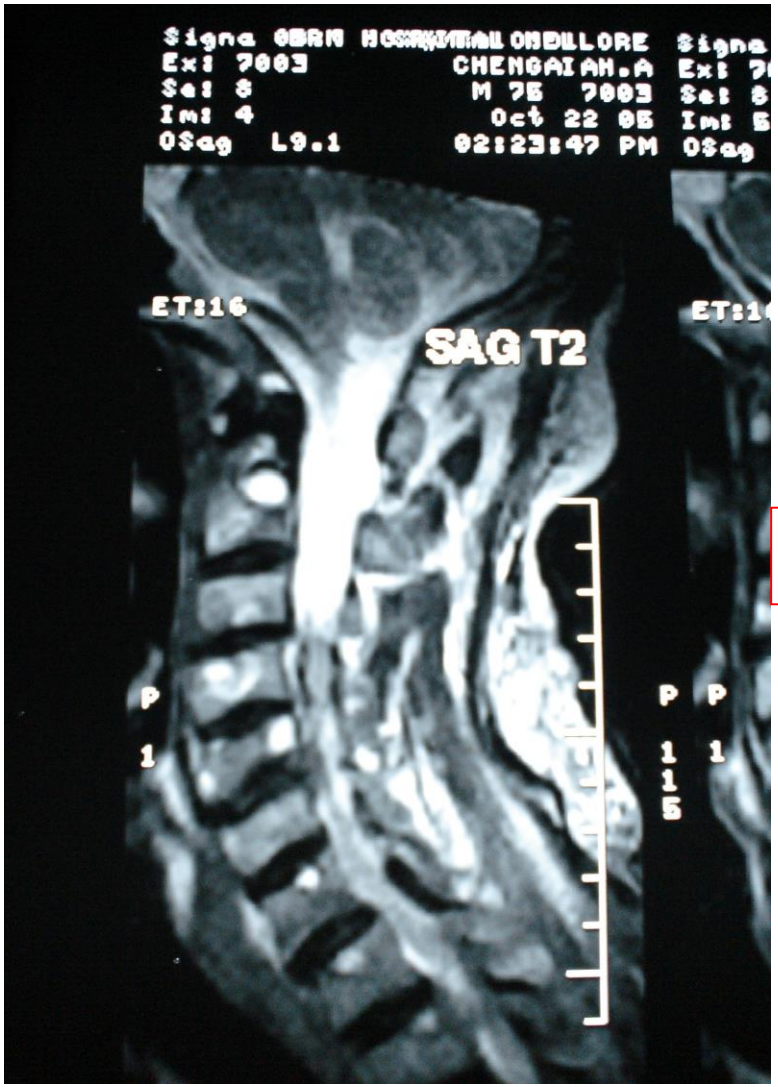
- **X-Ray skull - lytic lesions**
- **X-Ray vertebrae & chest - sclerotic lesions**
- **MRI spine screening at all levels-Multiple hyperintense lesions**







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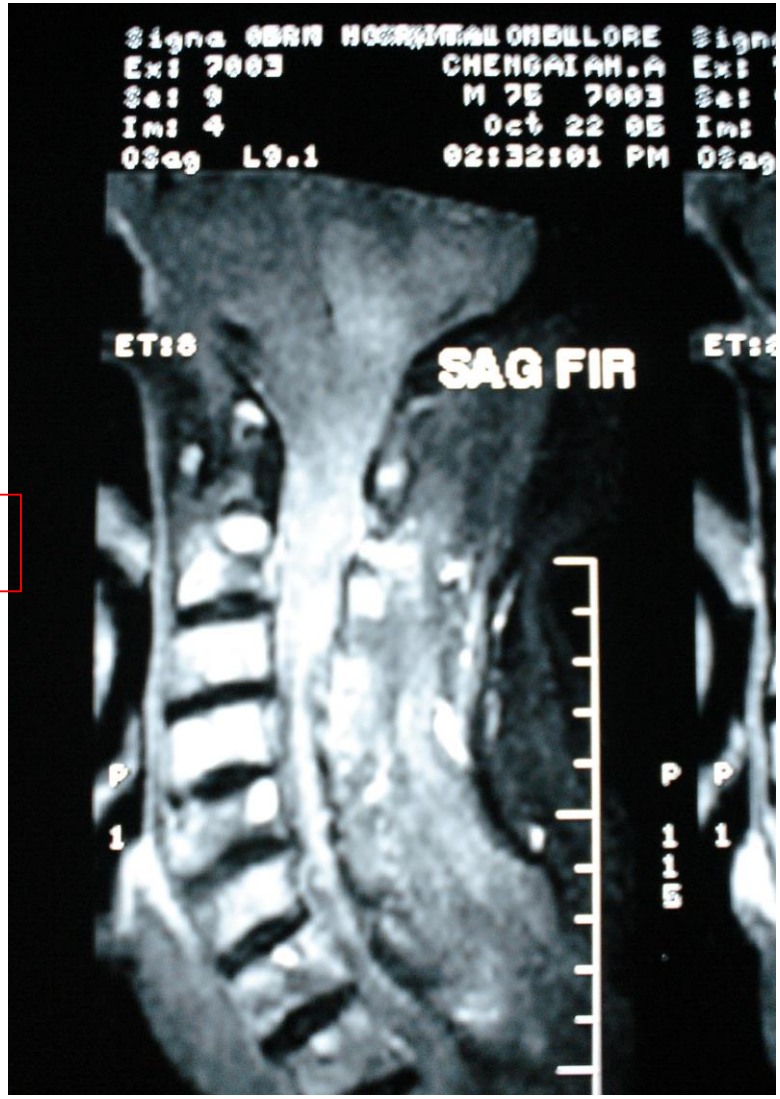
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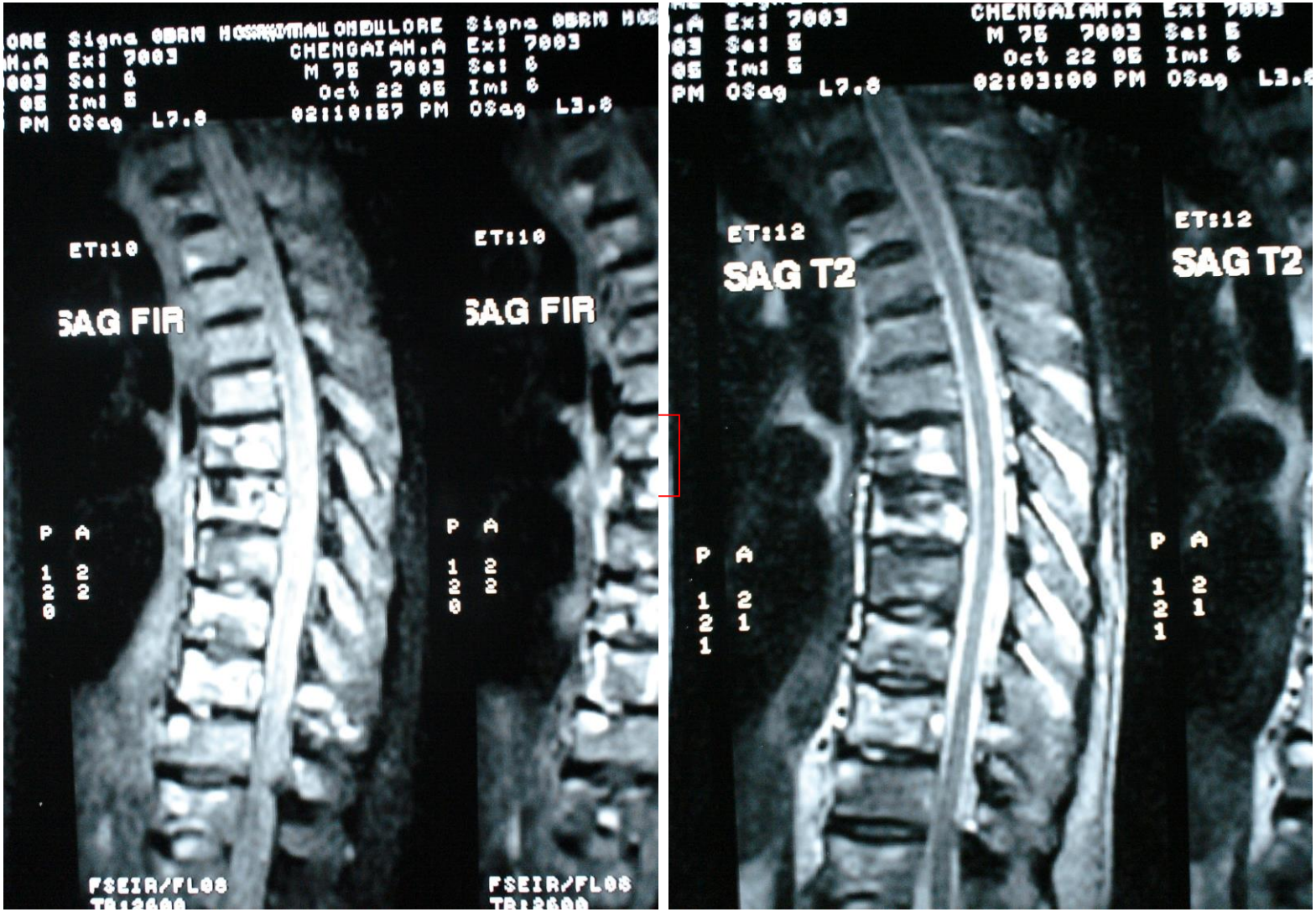

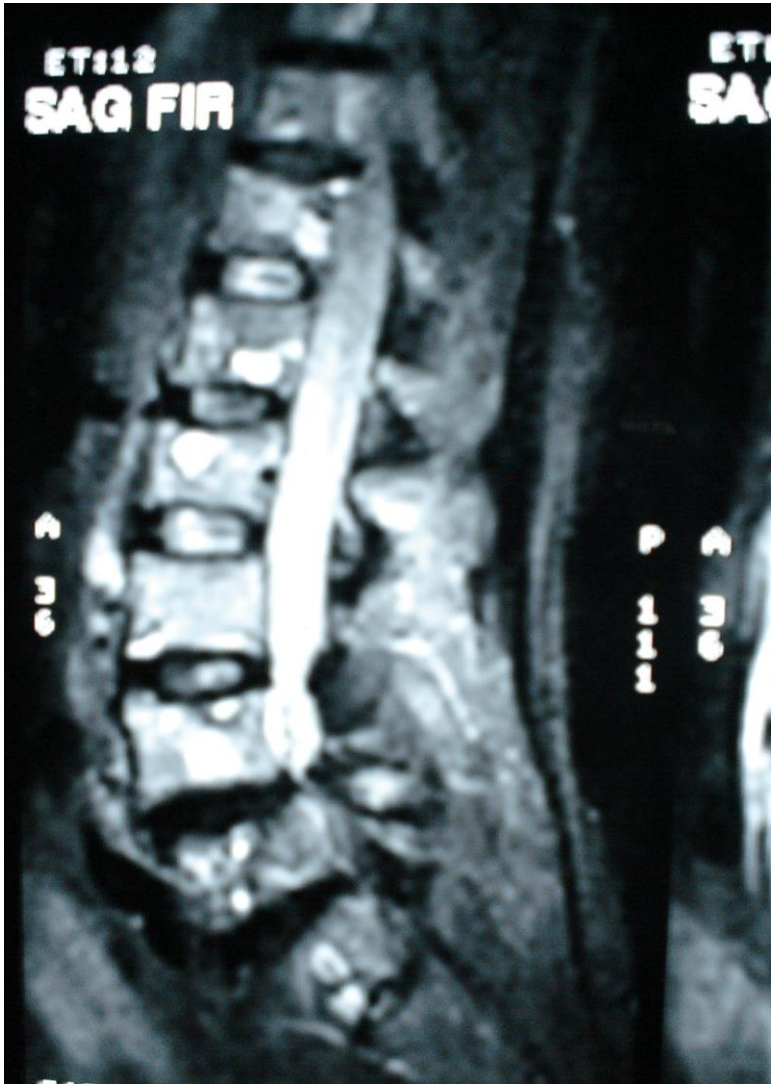
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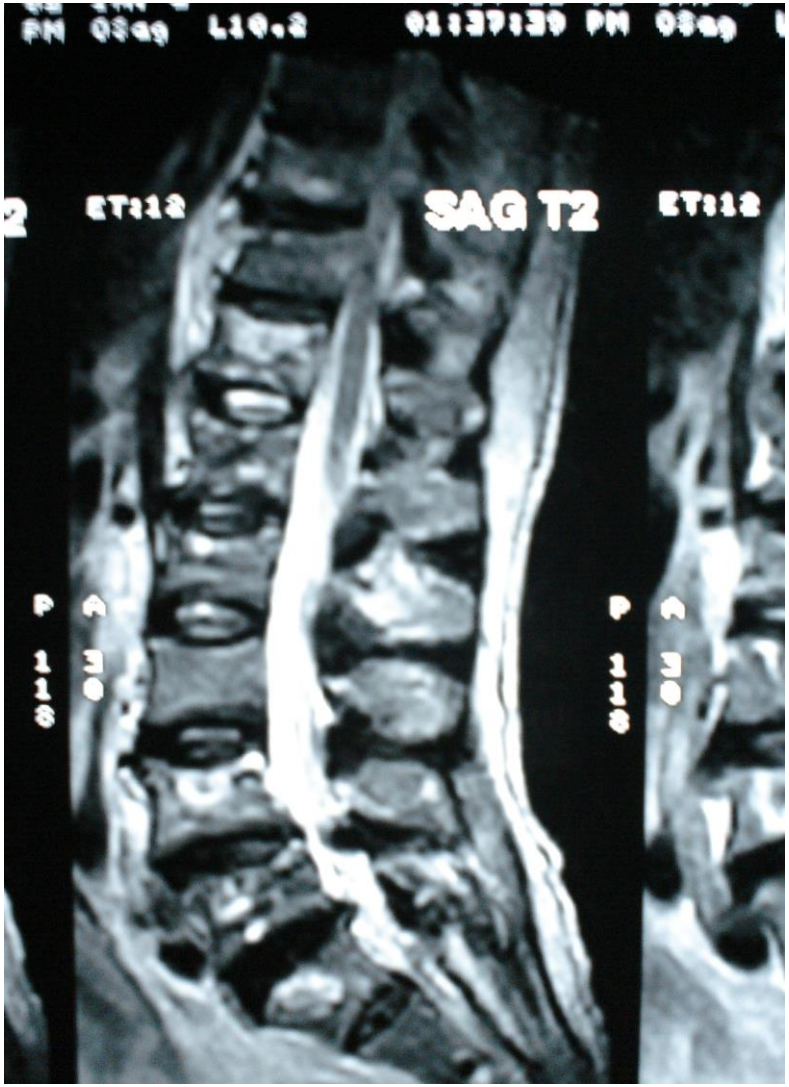
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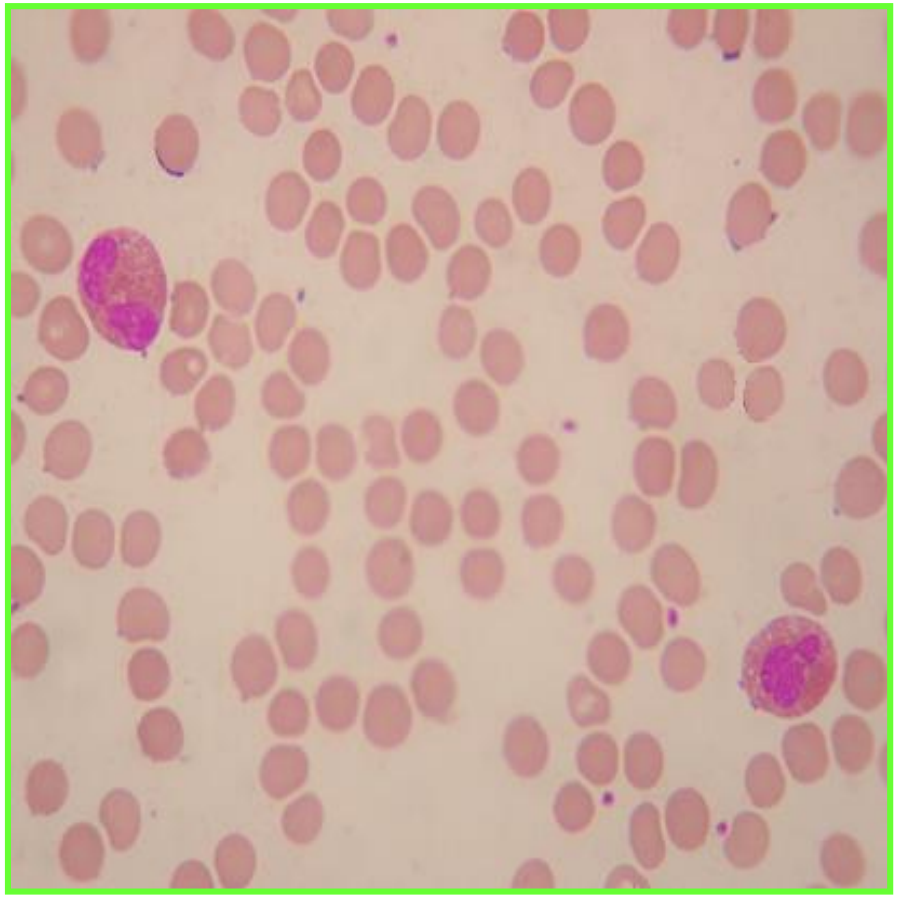
Radiological Differential Diagnosis

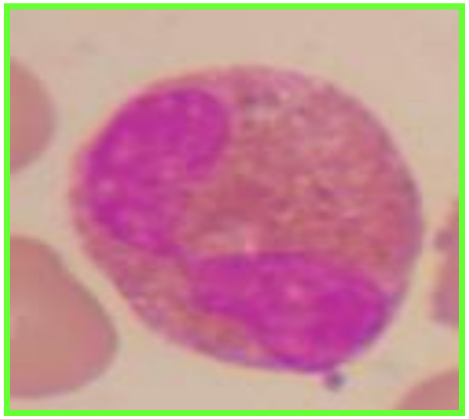
1. Myelofibrosis
2. Multifocal tuberculosis
3. Myeloma
4. Metastasis

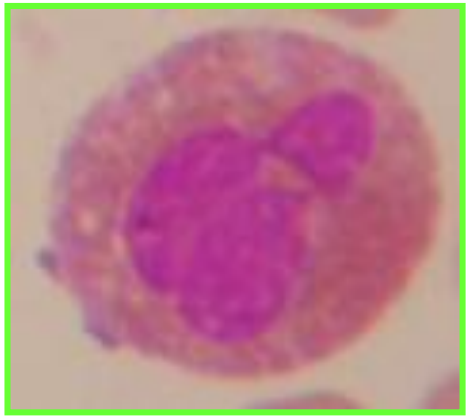
COMPLETE BLOOD PICTURE

Hemoglobin	: 10.1 gms/dl	M : 14 – 16 gms/dl F : 12 – 14 gms/dl
Total WBC Count	: 11600 /cumm	4000 – 11000/Cumm
Differential Count		
Neutrophils	: 47 %	40-70 %
Lymphocytes	: 20 %	25-40 %
Monocytes	: 11 %	01-08 %
Esinophils	: 22 %	01-04 %
Platelet Count	: 8,00,000 /Cumm	1.5 –4.0 lakhs/Cumm
MCV	: 79 FL	80-97 FL
MCH	: 27.5 pg	26.5-33.5 pg
MCHC	: 34.9 g/dl	31.5-35.0 gdl
RDW	: 14.3 %	1.0-15.0 %
ESR	: 135 mm 1st hr	M: 4-10 mm 1st hr F: 8-20 mm 1st hr

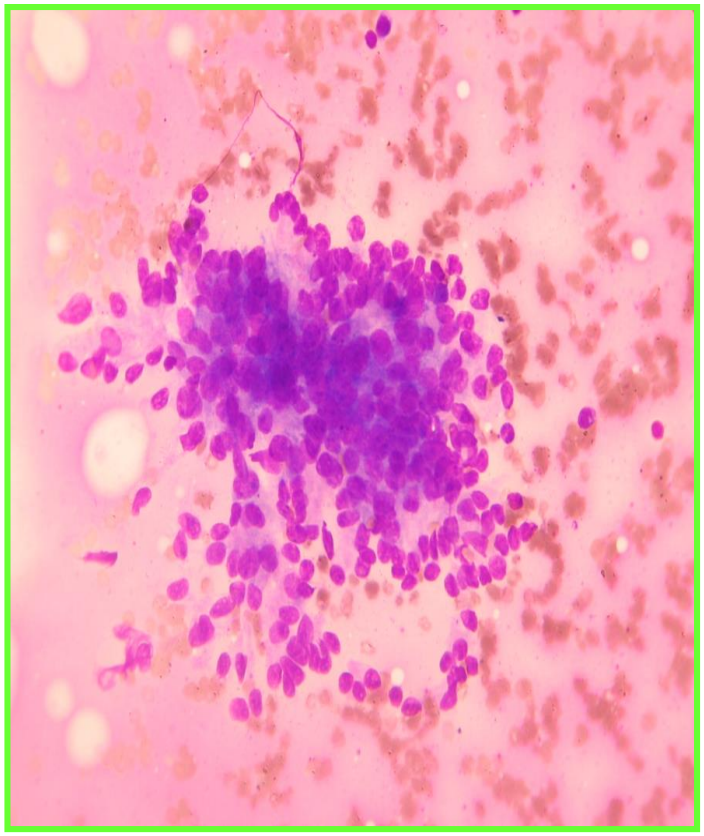
Peripheral Smear H-23/05

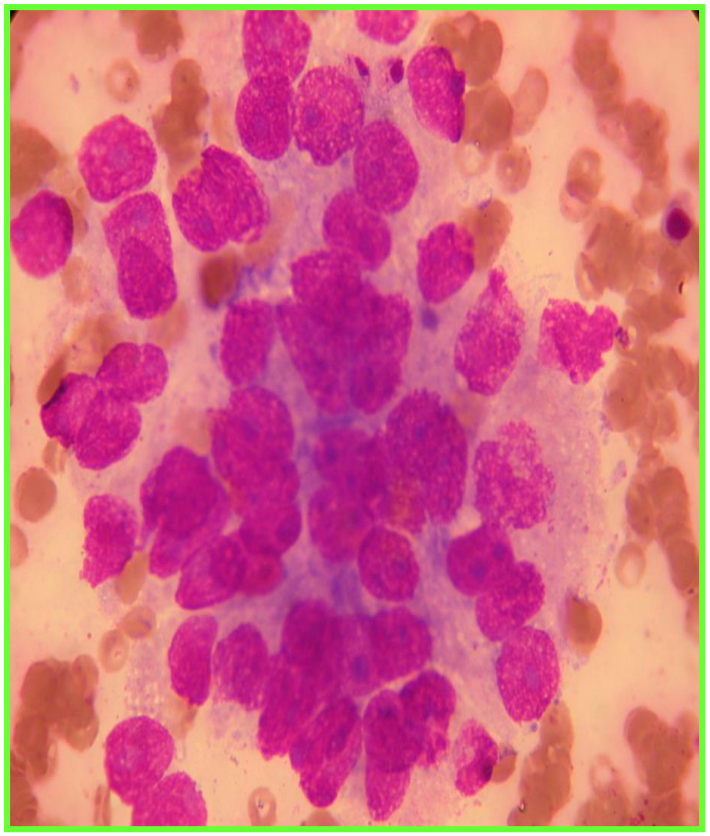




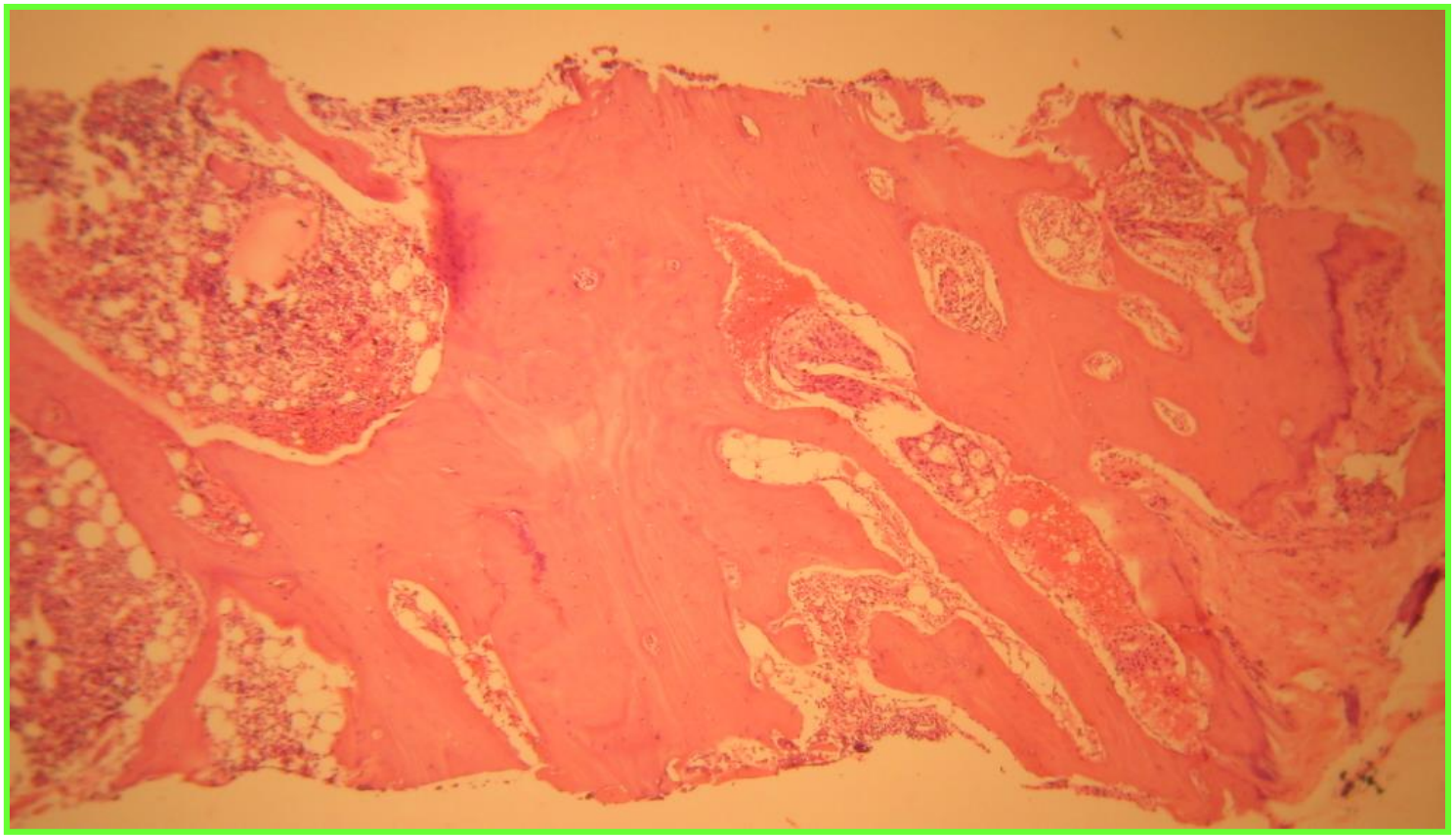


Bone Marrow Aspiration– H23/05

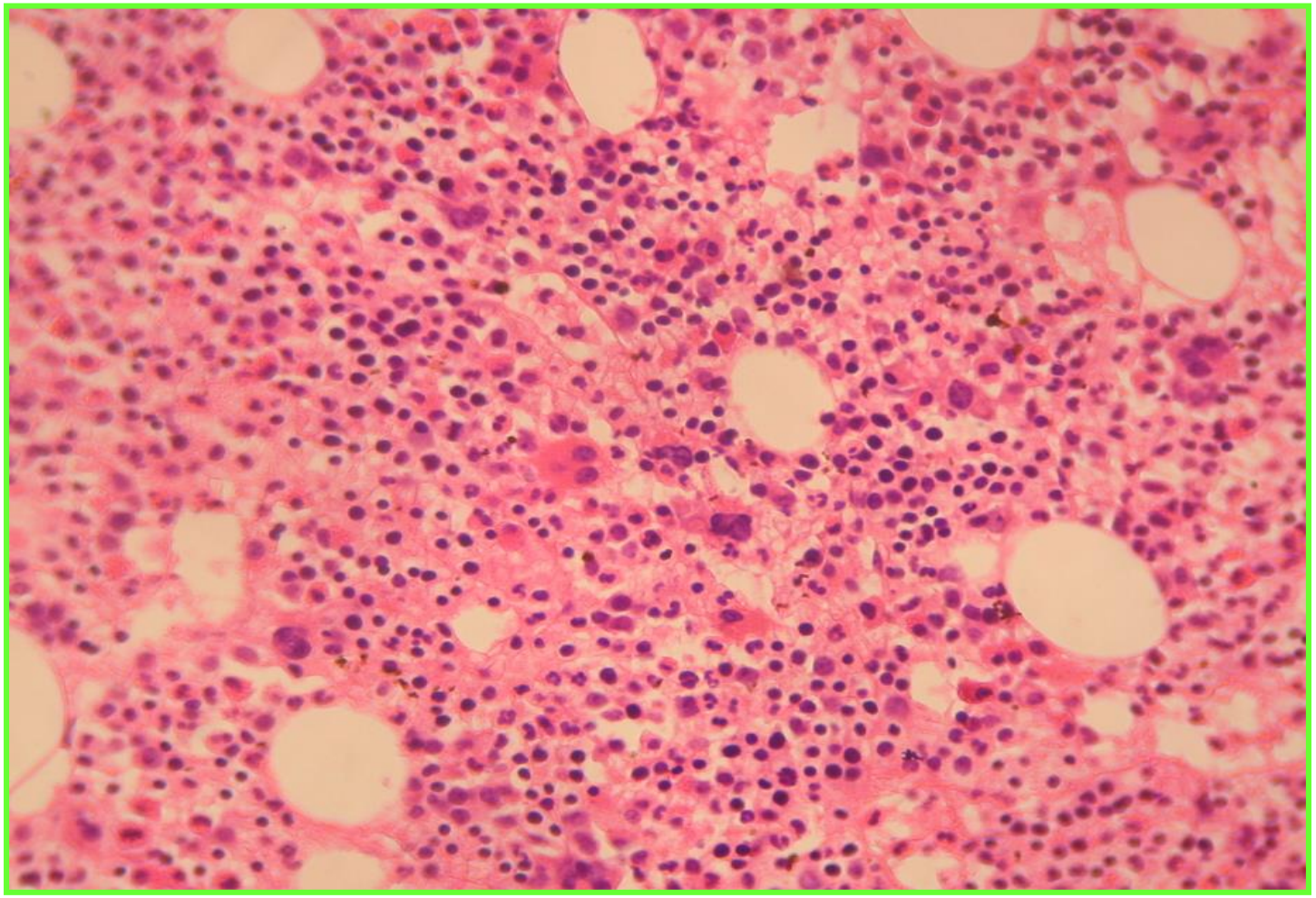




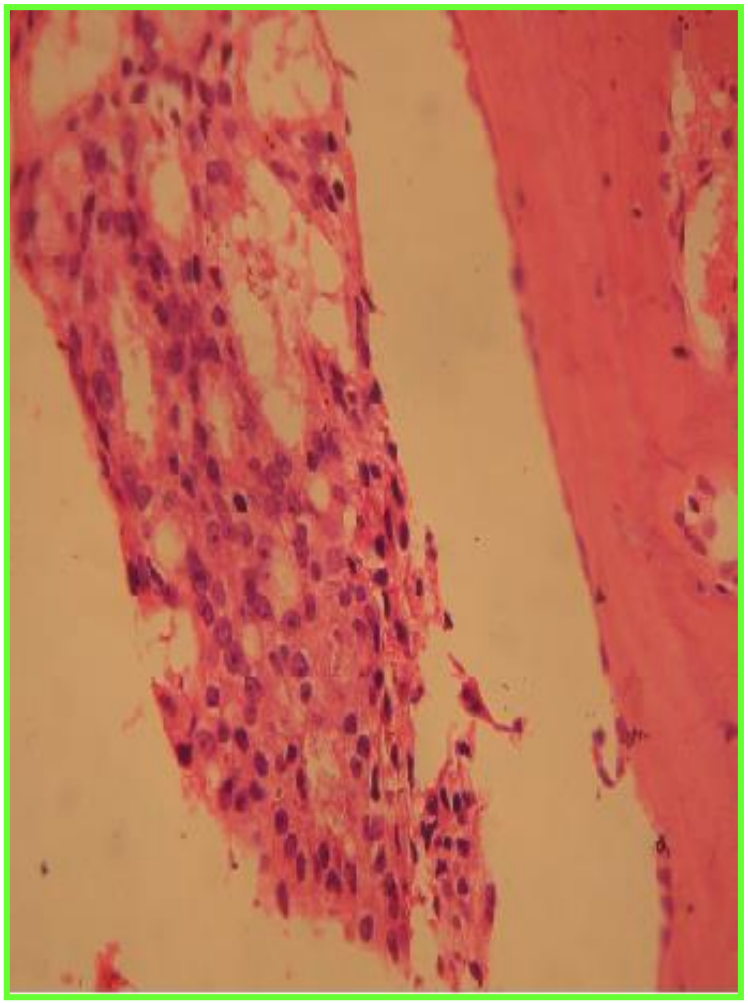
Bone Marrow Biopsy- H23/05

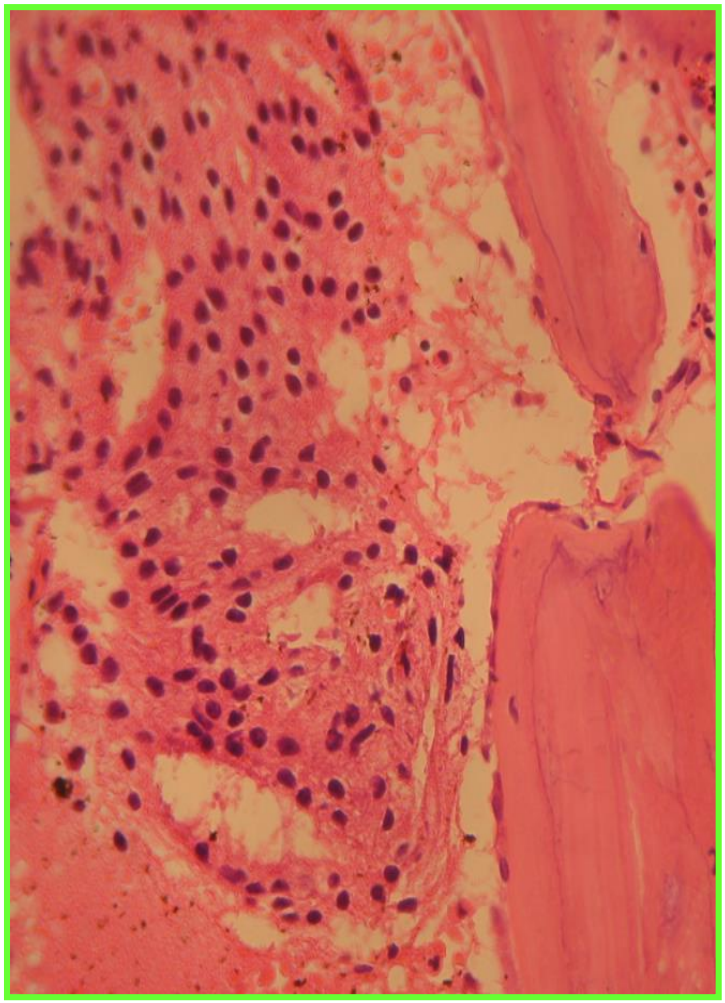


Bone Marrow Biopsy- H23/05

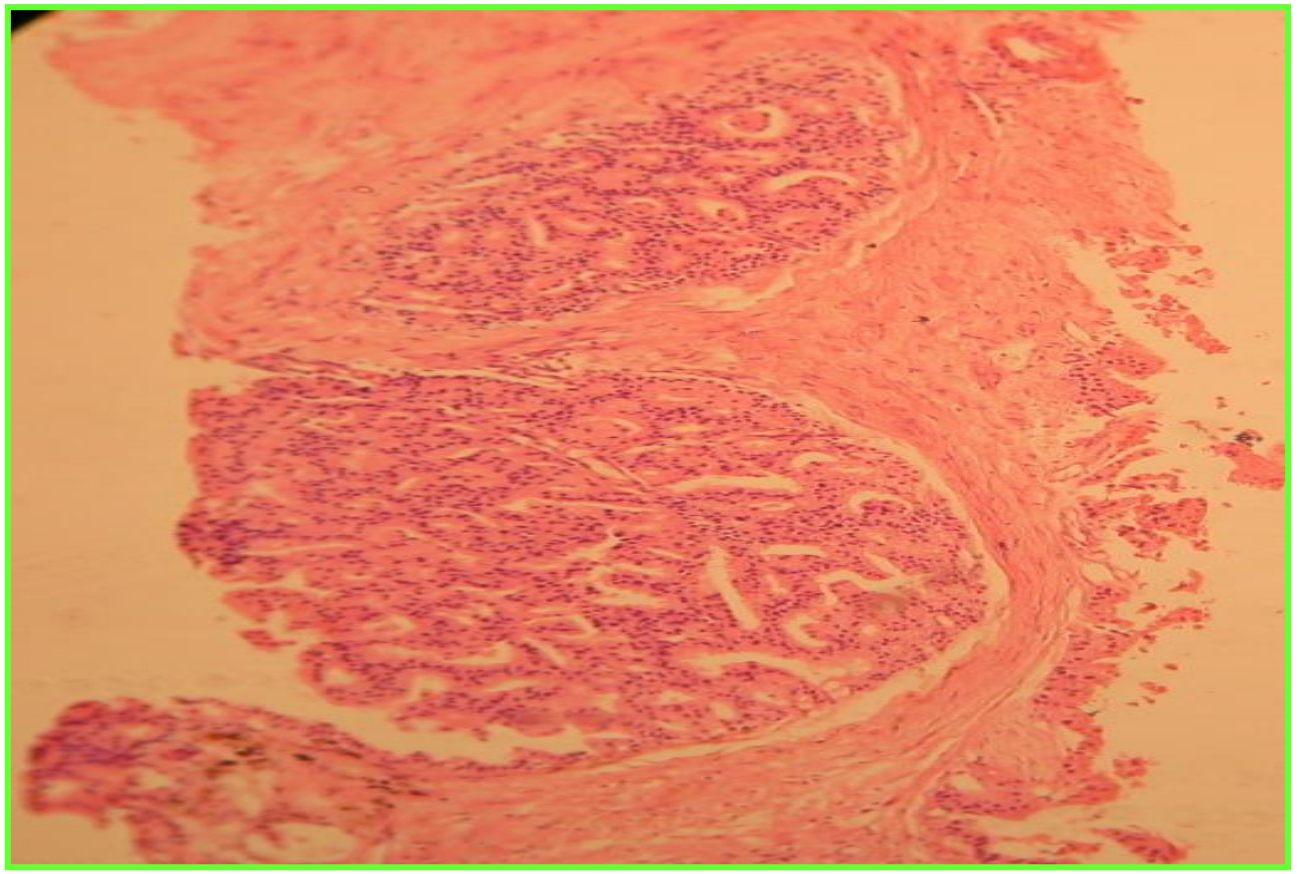


Bone Marrow Biopsy- H23/05



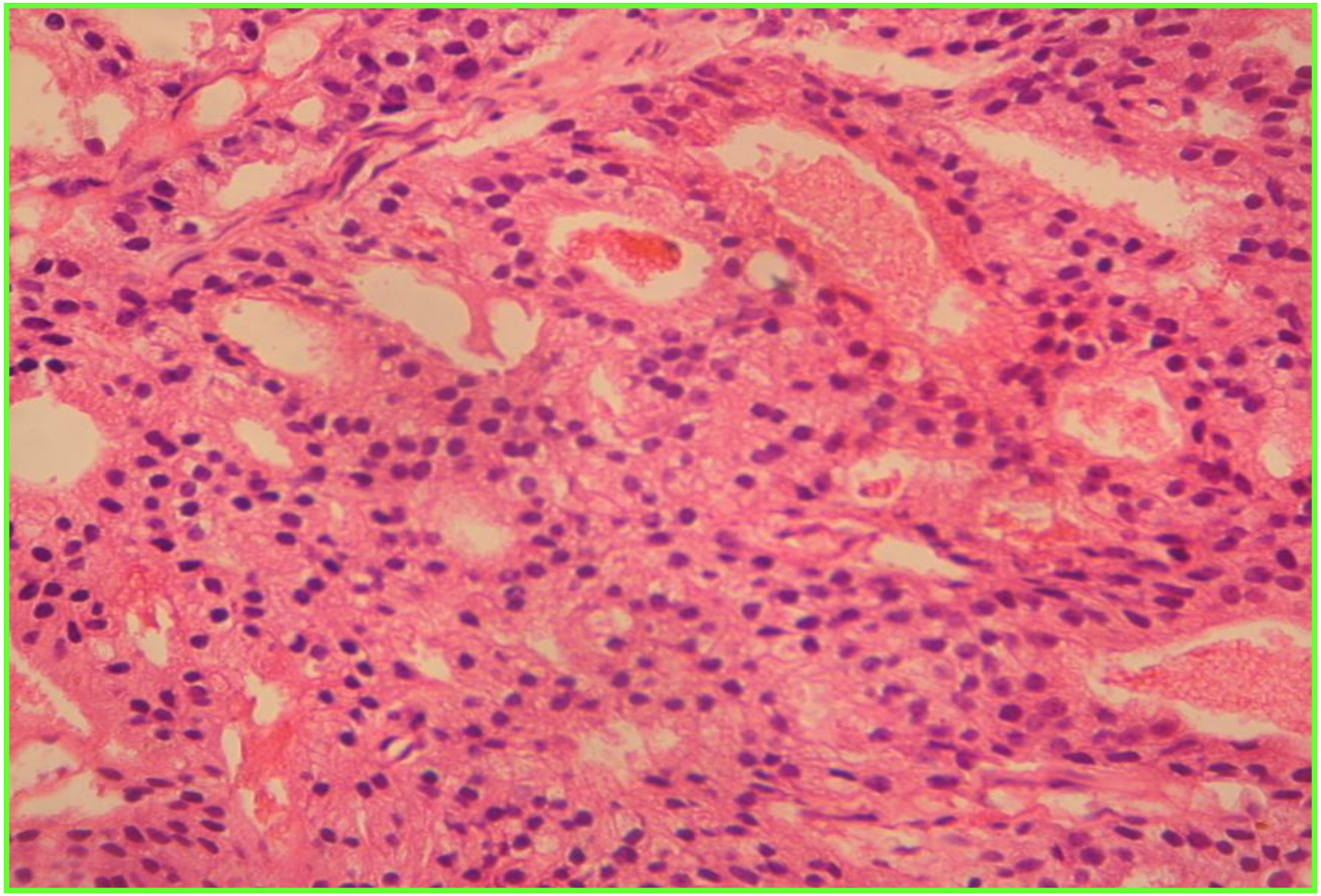


Prostate-True cut Biopsy

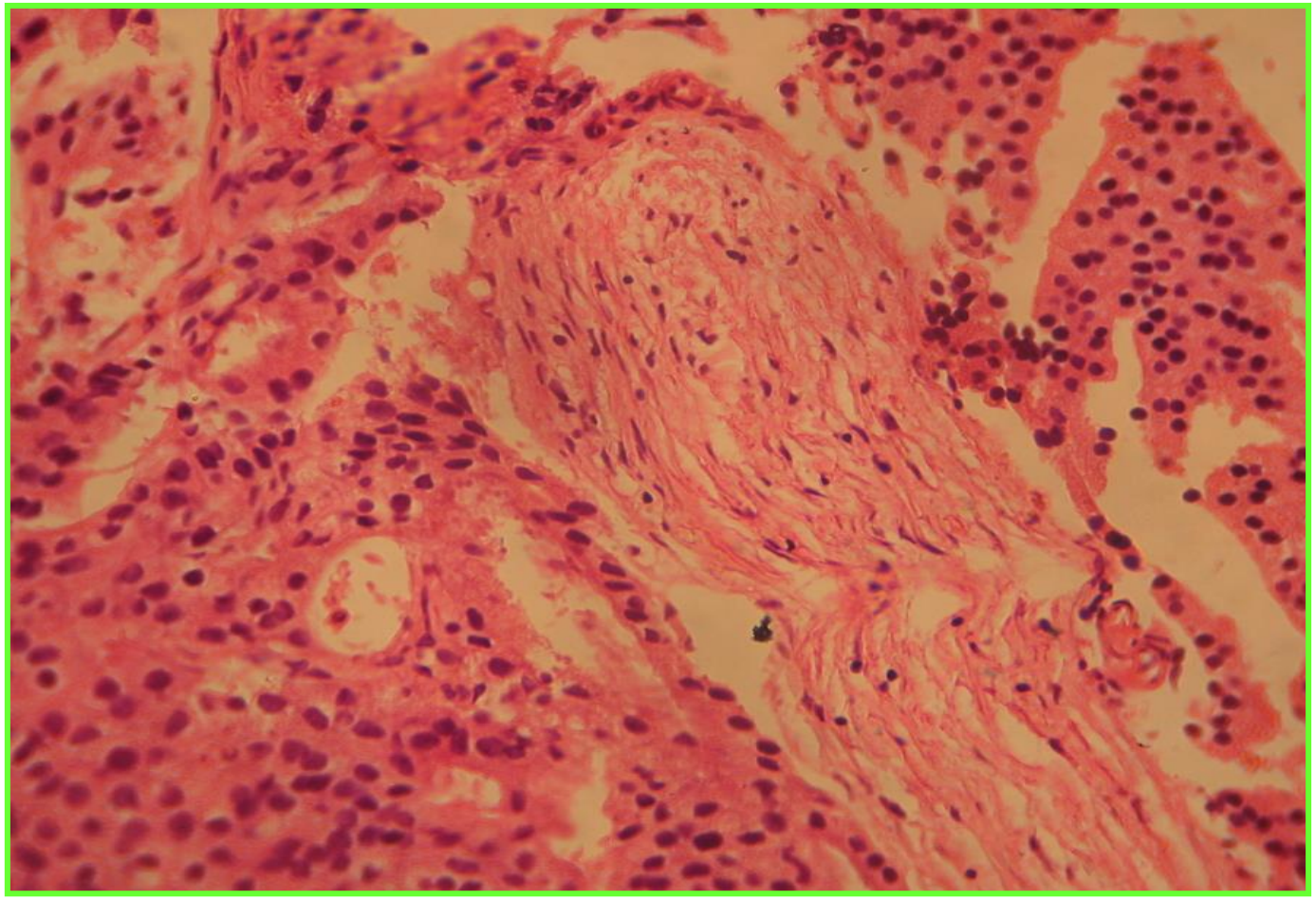


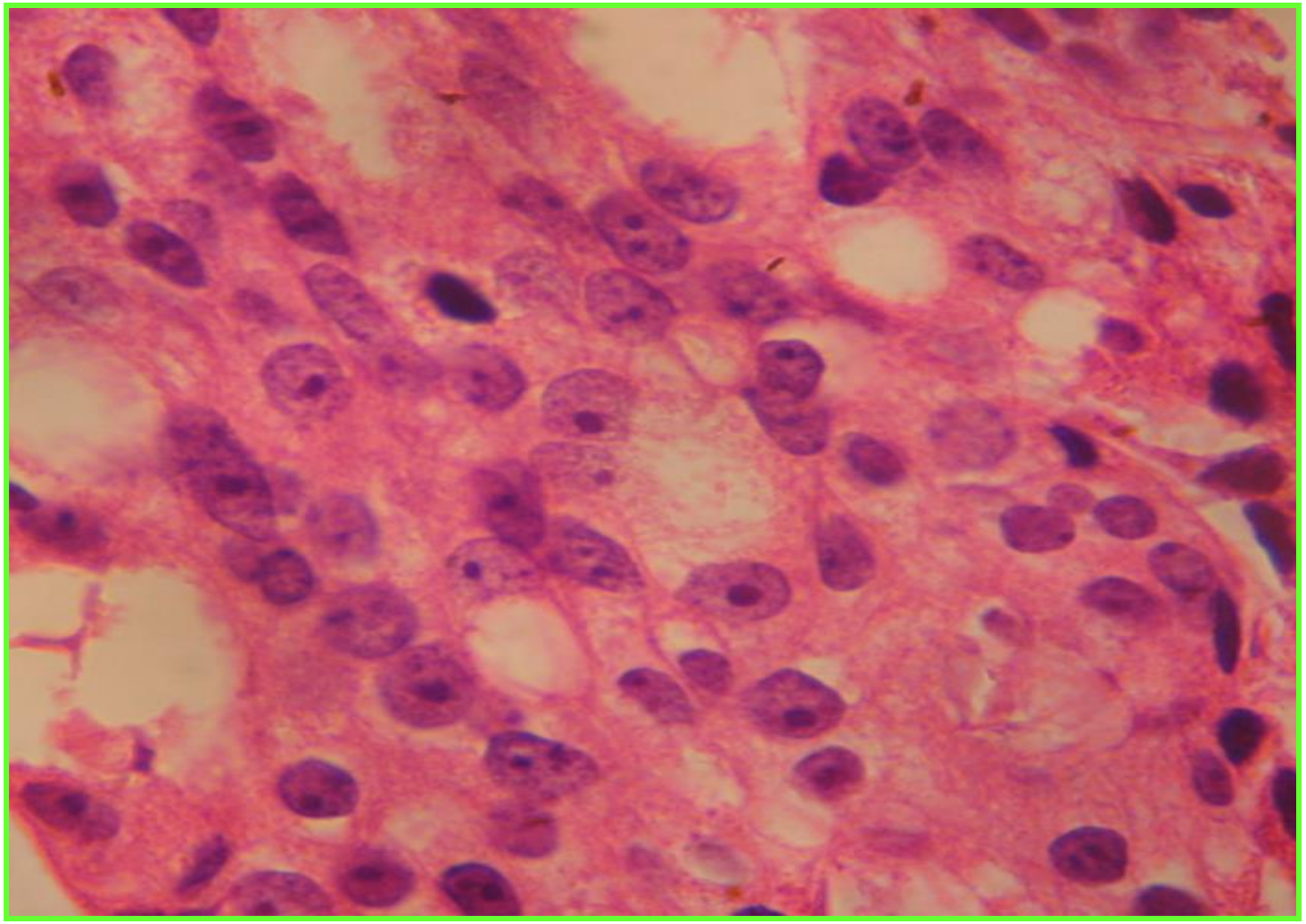
PSA : 156.8 ng/dl

Ca - Prostate



Ca - Prostate





Metastatic Tumors involving Bone marrow

Bone marrow metastasis is third most common after lung & liver metastasis

- **Adults : Most Common primary sites - Prostate, Breast & Lung**
- **Children : Neuroblastoma, RMS, RB, Ewings & Other PNETs**

Metastatic Tumors involving Bone marrow

1. Bone Pains
2. Pathological fractures
3. Lytic or Sclerotic lesions
4. Unexplained ‘hot spots’ on isotopic bone scans
5. Hypercalcemia / ↑ SAP activity
6. Unexplained hematological abnormalities

Bone marrow metastasis-Radiology

- **MC sites: Vertebrae, pelvic bones, ribs & skull bones**
- ***Osteolytic* (75%):Renal cell carcinoma, melanoma, non-small cell lung cancer, non-hodgkin lymphoma, thyroid ca & sarcoma**
- ***Osteoblastic* /sclerotic(15%) :Prostate ca,NEC,small cell ca lung, Hodgkin lymphoma & medulloblastoma**
- **Mixed(10%): Breast ca, Gastrointestinal cancers and Squamous cell carcinomas**

Bone marrow metastasis – Peripheral blood Findings

- **Infiltration of marrow by malignant cells:**
  - ⇒ **Cytopenias**
  - ⇒ **Leuco-erythroblastic picture**
- **Features secondary to underlying malignancy but not directly due to marrow infiltration:**

i) Iron deficiency anemia

ii) Anemia of Chronic disease

iii)Micro-angiopathic hemolytic anemia

iv)Neutrophilia

v) Eosinophilia

vi) Thrombocytopenia

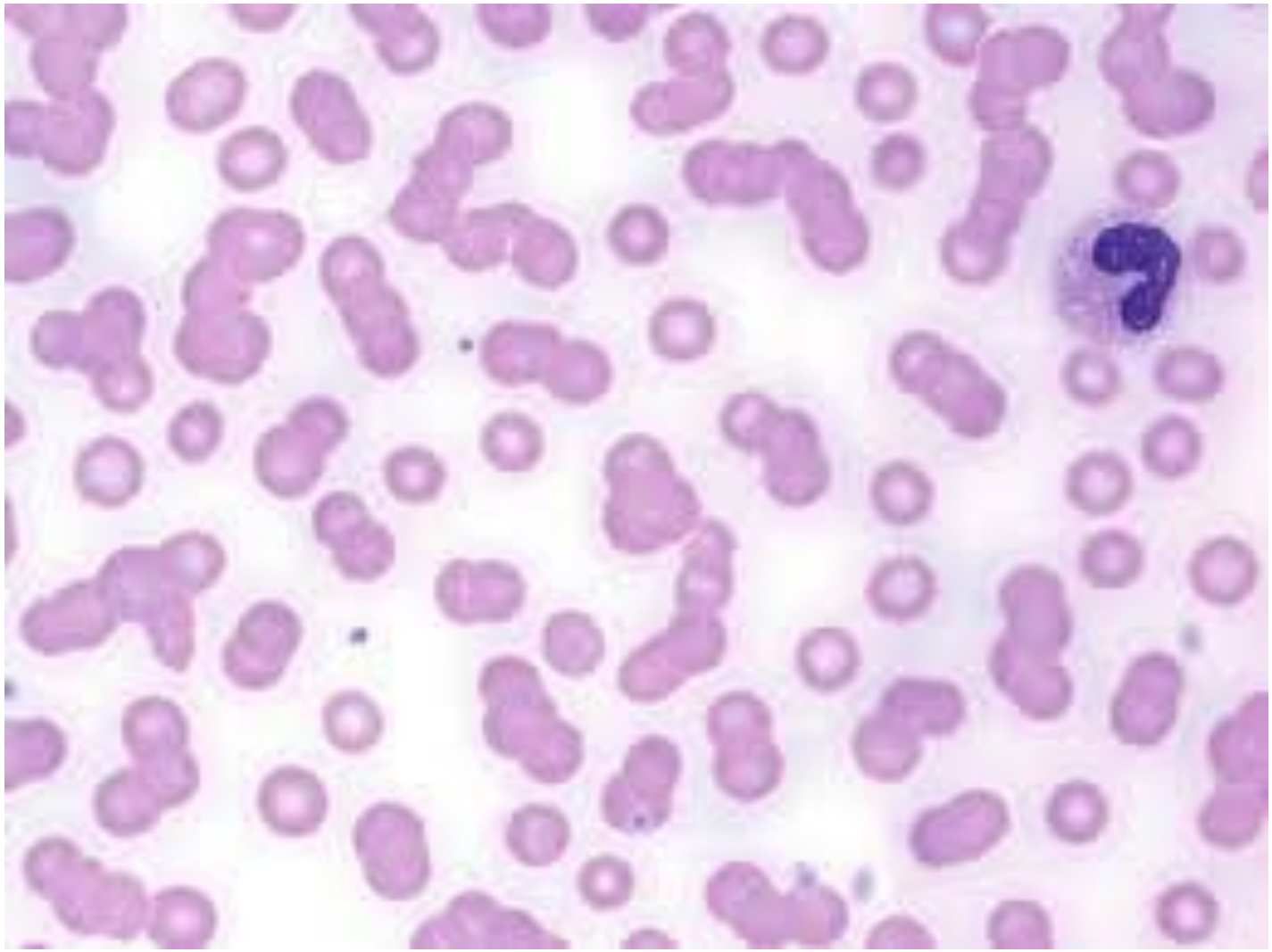
vii) Thrombocytosis

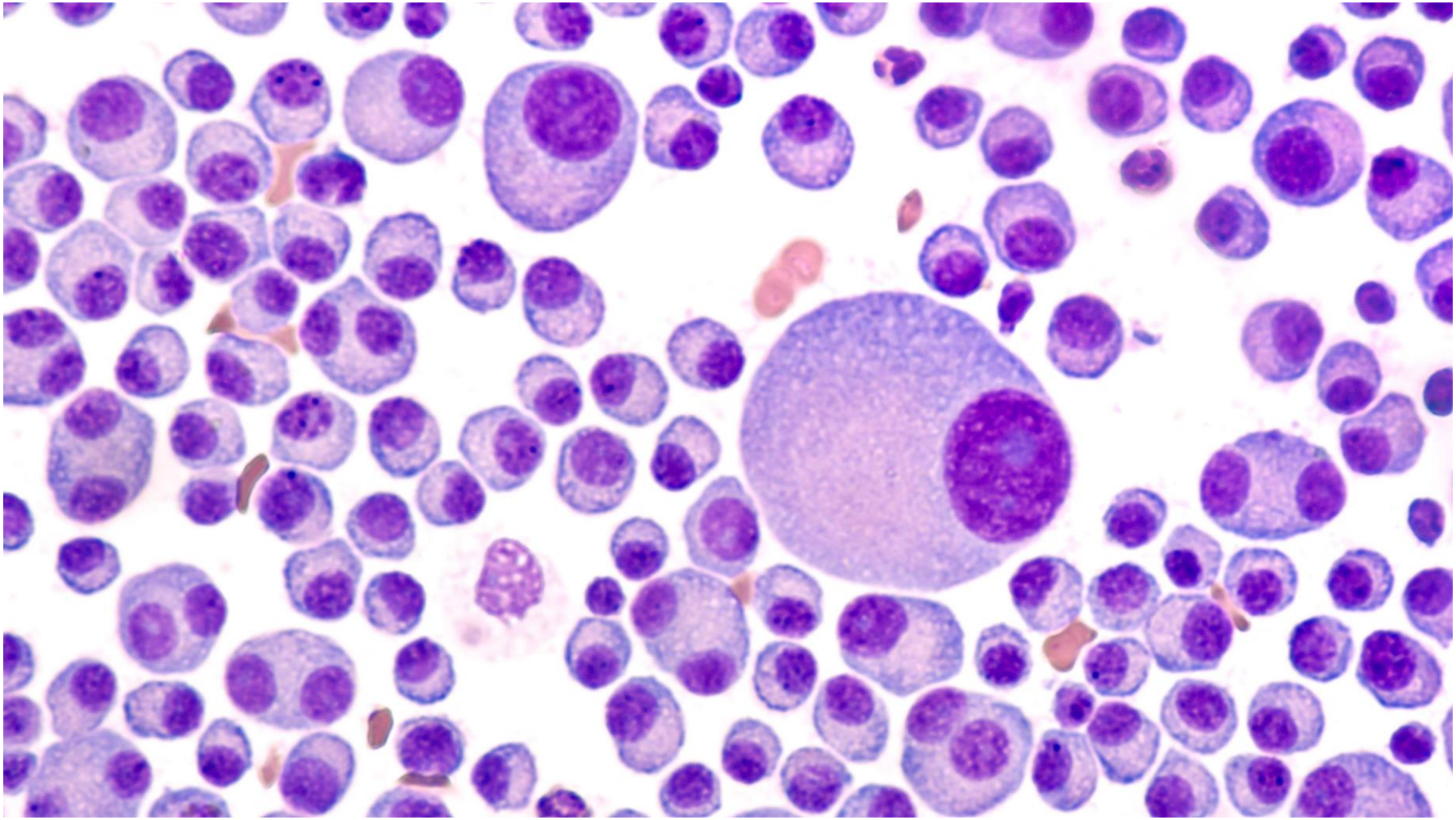
viii) Increased rouleux formation

Case-4

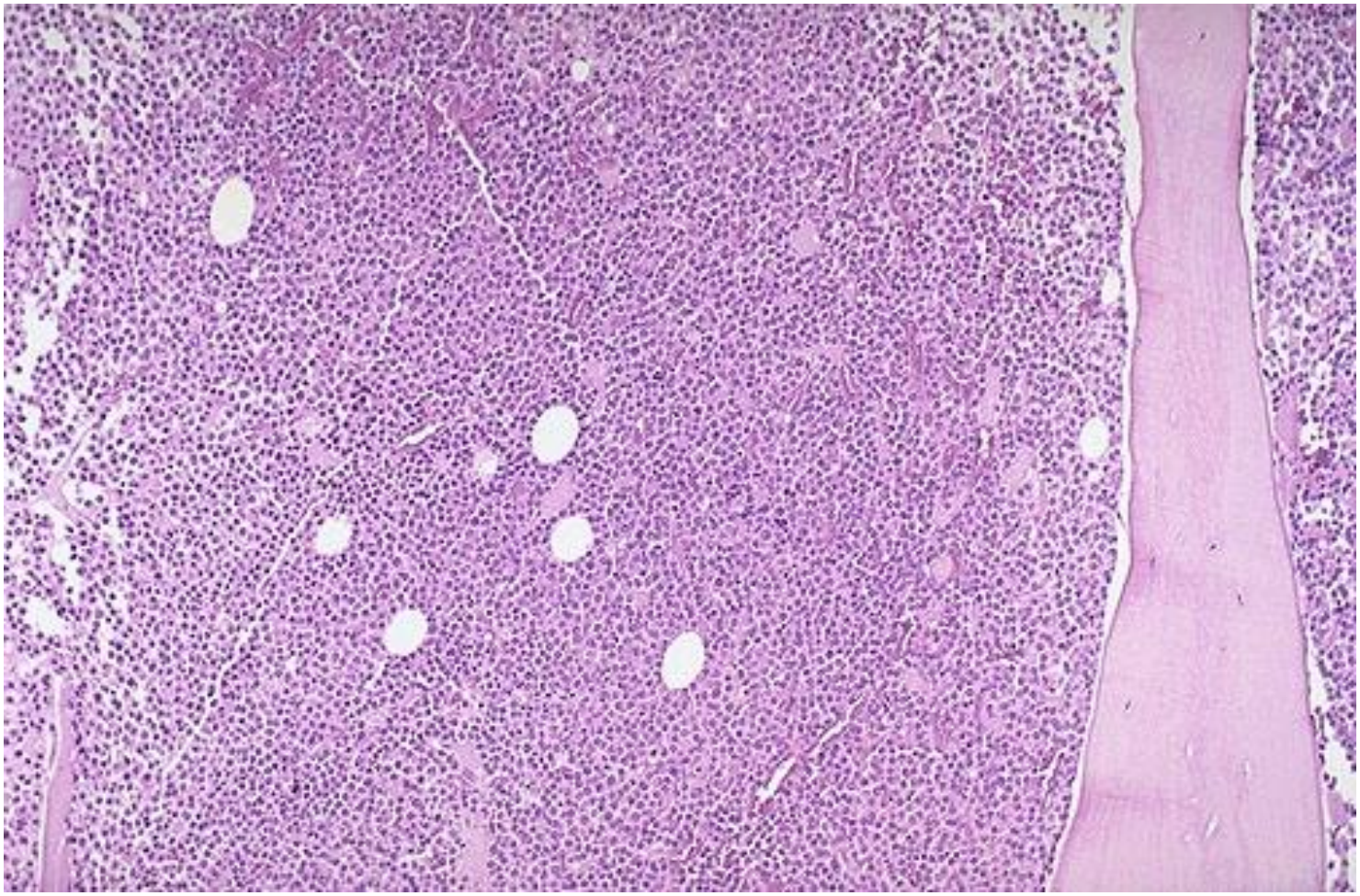
- **M/60 yrs**
- **Presented with pathological fracture**
- **Hb-5.2 gm%; ESR-100mm/1hr**
- **B.M-diagnostic**

Case 4 – Peripheral smear



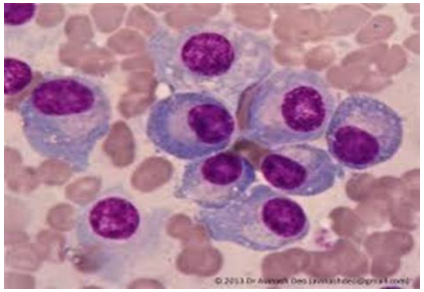


Bone marrow aspirate in Plasma cell myeloma



Bone marrow biopsy in Plasma cell myeloma

Multiple myeloma (Plasma cell myeloma)



Multifocal malignant proliferation of monoclonal plasma cells derived from a single clone of cells

- **Constitutes 1% of all malignancies &10% of hematological malignancies**

Incidence : Peak age : 50-60 yrs ; ↑ with age

Race : Blacks > Whites

Sex : Men > Women

MULTIPLE MYELOMA-CLINICAL FEATURES

- **Bone pains : Most common symptom**

  - Occur due to plasma cell proliferation in marrow / increased osteoclastic activity

  -Pathological fractures may occur

- **Anemia (myelothisic)**
- **Susceptibility to infections - Due to hypogammaglobulinemia**
- **Renal insufficiency**
- **Hyperviscosity syndrome - due to Hyperglobulinemia**

Hematologic Parameters in MULTIPLE MYELOMA

- **RBC: Normocytic & Normochromic anemia with rouleaux formation due to↑ globulins**
- **TLC, DLC & Platelets: Normal initially ; Leukopenia & thrombocytopenia in late stage**
- **ESR is high due to high gamma globulins**

- **Plasma cell leukemia Absolute plasma cell count > 2000 cells /cumm in blood**

Biochemical Parameters in MULTIPLE MYELOMA

- Serum calcium & phosphate - Increased
- RFT: Increased urea, creatinine & uric acid in 25% of cases
- Serum β2-Micro globulin – Increased, useful prognostic marker
- Serum free light chain assay – Ratio of involved chain : uninvolved chain is >100

MULTIPLE MYELOMA - DIAGNOSTIC CRITERIA (Updated International Myeloma Working Group)

Criteria I: Clonal bone marrow plasma cells ≥ 10%

(or) Biopsy-proven bony / extramedullary plasmacytoma

Criteria II:

Any one or more of following 7 Myeloma defining events:

1. **[C] Hypercalcemia (serum calcium >11 mg/dl)**
2. **[R] Renal insufficiency (serum creatinine >2mg/dl)**
3. **[A] Anemia (Hemoglobin <10 g /dl)**
4. **[B] Bone lesions: one or more osteolytic lesions on skeletal radiography, CT or PET**
5. **Clonal bone marrow plasma cells >60%**
6. **Involved chain : uninvolved serum free light chain ratio >100**
7. **More than one focal lesion on MRI (at least 5mm in size)**

MULTIPLE MYELOMA - DIAGNOSTIC CRITERIA
(Updated International Myeloma Working Group 2018)

Asymptomatic (smoldering) Myeloma:

- **M Protein in serum at myeloma levels (>3g/dl of IgG or >1g/24hr of urine light chain)**

  AND/OR

- **10-60% clonal plasma cells in bone marrow**
- **Absence of myeloma defining events**


A Journey of a Thousand Miles
Must Begin with a Single Step
Thank 'u'