

Diagnosis of Multiple Myeloma

A Case Study

Case Study

- Mr. S is a 57-year-old Caucasian male with no past medical history except for well-controlled hypertension
- The patient tripped and developed a vertebral compression fracture
- He was evaluated for kyphoplasty and was found to have lytic bone lesions concerning for multiple myeloma

What is the proper evaluation to diagnose multiple myeloma?

What are the criteria for making the diagnosis of multiple myeloma?

Work-up for Suspected Multiple Myeloma

History and physical examination	
Blood	<ul style="list-style-type: none"> • CBC with differential • Basic metabolic panel including, BUN, creatinine, electrolytes, calcium, albumin, lactate dehydrogenase (LDH) • Serum quantitative immunoglobulins • Serum protein electrophoresis and immunofixation (SPEP) • β_2-microglobulin • Serum free light chain analysis
Urine	<ul style="list-style-type: none"> • 24-hr protein • Protein electrophoresis with immunofixation (UPEP)
Bone Marrow	<ul style="list-style-type: none"> • Unilateral bone marrow aspirate and biopsy evaluation with immunohistochemistry or flow cytometry, cytogenetics, and FISH
Imaging	<ul style="list-style-type: none"> • Skeletal survey • MRI and PET/CT as clinically indicated

CBC=complete blood count; BUN=blood urea nitrogen; FISH=fluorescence in situ hybridization; MRI=magnetic resonance imaging; PET/CT=positron emission tomography/computed tomography
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Criteria for Active Multiple Myeloma

- Monoclonal plasma cells in bone marrow ($\geq 10\%$)
and/or
- M-protein in serum and/or urine (≥ 30 g/L)
and
- ≥ 1 feature of end-organ damage
 - Calcium elevation (> 11.5 mg/dL)
 - Renal dysfunction (serum creatinine > 2 mg/dL)
 - Anemia (Hgb < 10 g/dL or 2 g/dL $<$ normal)
 - Bone disease (lytic lesions or osteopenic)

Hgb=hemoglobin

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Case Study: Laboratory Values

Lab/Normal Reference Range	Value
WBC 3.0–11.0 k/ μ L	6.11
Plt Ct 150–400 k/ μ L	165
Hgb 13.0–17.0 g/dL	11(L)
Hct 39.0–51.0%	33.1(L)
MCV 80–100 fL	89
RDW-CV 11.5–15.0%	15.2
Neut % 38.5–75.0%	82
Abs Neut 1.00–7.50 k/ μ L	3.2

Lab/Normal Reference Range	Value
BUN 8–25 mg/dL	47(H)
Creatinine 0.7–1.4 mg/dL	1.1
Calcium 8.5–10.5 mg/dL	10.2
Albumin 3.5–5.0 g/dL	3.6
Alk Phos 40–150 U/L	165 (H)
Beta 2 Microglobulin (B2M) (1.1 – 2.4 mg/L)	3.8mg/L (H)

WBC=white blood cell; Plt Ct=platelet count; Hct=hematocrit; MCV=mean corpuscular volume; RDW-CV=red cell distribution width-coefficient variation; Neut=neutrophils; Abs Neut=absolute neutrophils; Alk Phos=alkaline phosphatase

Case Study: Laboratory Values

SPEP: Lab/Normal Reference Range	Value
Alpha-1 0.11–0.22 g/dL	0.15
Alpha-2 Globulin 0.6–1 g/dL	0.75
Beta G 0.50–1.00 g/dL	1.05
Gamma Glob 0.60–1.35 g/dL	1.2
M-Spike (g/dL)	2.0(H)

Lab/Normal Reference Range	Value
Serum IgG 717–1,411 mg/dL	4300
Serum IgA 78–391 mg/dL	60
Serum IgM 53–334 mg/dL	28
Serum Kappa 534–1,267 mg/dL	277
Serum Lambda 253–653 mg/dL	12800

SPEP=serum protein electrophoresis; Gamma Glob=gamma globulin

Case Study-Patient Evaluation

Does Mr. S Have Multiple Myeloma?

- Results from his evaluation:
 - Calcium: 8.0 mg/dL
 - Creatinine: 1.1 mg/dL
 - Serum albumin: 3.6 g/dL,
 - Hemoglobin: 11 g/dL
 - β 2-microglobulin: 3.8 mg/L
 - SPEP: 4.3 g/dL M-component protein IgG λ
 - Bone marrow aspirate: 21% plasma cells with diploid cytogenetics
 - FISH: 30% t(11;14)
 - Bone survey: Multiple lytic lesions
 - MRI: Multiple heterogeneous marrow lesions
- Mr. S has an elevated M-protein, > 10% plasma cells in his bone marrow, and bone lesions. He has multiple myeloma