High Risk Newly Diagnosed Multiple Myeloma

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Background

- Multiple Myeloma (MM) is the neoplastic proliferation of plasma cells leading to an increase in monoclonal immunoglobulins. The infiltration of plasma cells into various organs leads to the common clinical presentation of hypercalcemia, renal insufficiency, anemia, and bone disease.
- Multiple Myeloma is most commonly seen in older adults, men more so than women, with an average age of sixty-five to seventy-four years. We present an unique case concerning a 44-year-old male presenting with malaise and shortness of breath.

Case Description

- A 44-year-old male with no known past medical history presented with worsening shortness of breath, increasing malaise, and atypical chest pain. Several abnormalities were noted on initial labs, which included **acute kidney injury** with an elevated creatinine of >28 mg/dL, **uremia** with a BUN 231 mg/dL, anion gap metabolic acidosis with a carbon dioxide of 8 mmol/L, **hyperkalemia,** and **severe normocytic anemia** (Hgb 6.9 g/L) with no reported source of bleeding. Imaging revealed **extensive lytic lesions** throughout the calvarium, spine, pelvis, ribs, and sternum.
- The patient was admitted to the intensive care unit for emergent dialysis and underwent further workup for concern of MM. Serum and urine protein electrophoresis (**SPEP, UPEP**) were negative for a monoclonal spike. However, **immunofixation** was remarkable for **IgG kappa monoclonal protein**. **Beta 2 microglobulin** was found to be **elevated at 38.5mg/L and LDH and albumin were normal**. Bone marrow biopsy revealed plasma cell myeloma with **20-30% clonal plasma cells**. Kappa/Lambda **light chain ratio** was found to be **45.9**. Fluorescence in situ hybridization (**FISH**) studies revealed **gain of chromosome 9, deletion of 1p and loss of P53 in chromosome 17**. Clinically, the patient improved after dialysis and, after placement of a tunnel catheter for dialysis, was stable to be discharged from the hospital and followed up with hematology-oncology for further outpatient care.

Physical Exam

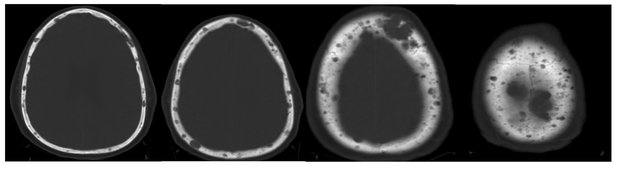
Vitals:
T: 37.2°C
P: 130 bpm
RR: 22rpm
BP:106/68 mmHg
O2 Sat: 98% on RA
BMI: 39.4

General Appearance: alert, awake, oriented, pleasant, mental status normal
Neck: no JVD, no lymphadenopathy
Cardiovascular: irregularly irregular, tachycardic
Respiratory: clear to auscultation, no distress, on room air
Abdomen: soft, non-tender, no distention
Extremities: moves all, no edema, no calf tenderness, normal temperature
Skin: dry, intact, no rash
Neuro: alert and oriented x 4, no neuro deficits

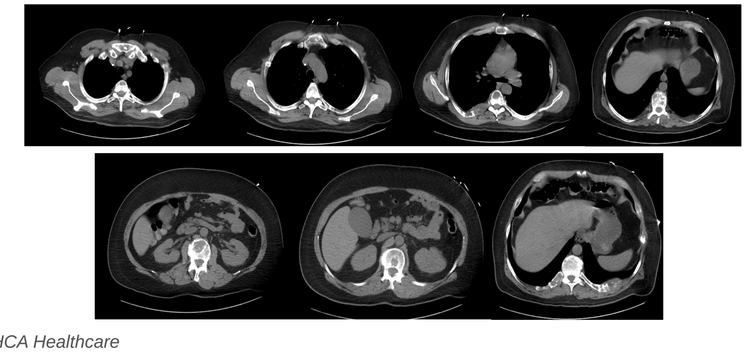
Labs and Imaging

	Patient	Normal Range
Serum Potassium	5.7 mmol/L	3.4-5.0 mmol/L
CO2	8 mmol/L	22-30 mmol/L
BUN/Cr	231/ >28 mg/dL	7-17/0.5-1.0 mg/dL
Hgb	6.9 g/L	12.0-16.0 g/dL
SPEP/UPEP	M spike: Not observed	--
Immunofixation	IgG Kappa	--
Kappa/Lambda Ratio	45	1.03-31.76
FISH	Gain of 9, del 1p, del of 17p	--
Bone Marrow Bx	20-30% clonal plasma cells	--

CT Head w/o Contrast: Extensive lytic destructive lesions throughout the calvarium.



CT Chest, Abdomen, and Pelvis w/o Contrast: Widespread osseous metastatic disease seen throughout the visualized spine, pelvis, ribs, and sternum.



Discussion

- Multiple myeloma is increasingly seen as a heterogeneous disease with its overall survival determined by multiple factors. Patient characteristics, cytogenetics, and clinical features are used to risk stratify newly diagnosed MM.
  - An analysis of **10,549 MM patients**, with **1689 patients younger than 50 years old showed more favorable features** such as low risk staging and less frequent adverse prognostic factors in this age group.
  - Despite our patient's young age at diagnosis, which is seen in about **3%** of cases, his clinical presentation and cytogenetics categorize him as high risk.
  - Our patient's FISH analysis revealed a **deletion of 1p** and **loss of P53 in chromosome 17**, contributing to the high risk nature of the patient's multiple myeloma. The frequency of these chromosomal abnormalities are **30% and 10%,** respectively.
- While survival for standard risk MM has greatly improved due to novel treatments, high risk MM continues to have poor prognosis.
- Correctly staging the high risk newly diagnosed MM patients becomes imperative as treatment strategies are chosen for these individuals and must involve the various factors that play an influential role in the overall survival.

References

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