More Myelocytes, More Problem . . .
But Not Necessarily an Emergency
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INTRODUCTION
- Oncologic emergencies are:
  - Acute clinical conditions caused by a patient’s cancer or its treatment that require rapid intervention to prevent loss of life or severe permanent damage
  - Two oncologic emergencies that can occur in hematologic malignancies:
    - Leukostasis
    - Tumor Lysis Syndrome (TLS)

Does this patient have an oncologic emergency?

PATIENT PRESENTATION
- History of Present Illness:
  - Vital signs within normal limits
  - GI review of systems was otherwise negative
- Laboratory Data:
  - CT Abdomen/Pelvis: massive LFTs, lipase, TSH, lactate within normal limits
  - PT 15.8 (H – nl 11.9-14.5 sec)    PTT 38.1 (H – nl 24.0-35.0 sec)    INR 1.28 (H nl 0.9-1.2)
  - LDH 1,015
  - Calcium 9.6 (n)      Magnesium 2.2 (n)      Phosphate 4.1 (n)      Uric acid 8.9 (slightly elevated)

LABORATORY DATA
- Manual Differential:
  - Neutrophils 72%    Lymphocytes 12%    Monocytes 1%    Eos 2%    Baso 3%
  - Bands 26%    Myelocytes 23%    Metamyelocytes 13%    Promyelocytes 1%    Blasts 3%

- Cytogenetic Analysis:
  - 40-year-old previously healthy man presented to the ED with a 3-day history of bright red bloody per rectum
  - Associated fatigue, easy satiety, and an unintentional 80lb weight loss
  - GI review of systems was otherwise negative

- Physical Exam:
  - Vital signs within normal limits
  - Abdomen: distended, firm, non-tender abdomen
  - Extremities: scattered hemanomas

- CT abdomen/pelvis showing massive splenomegaly in patient with newly diagnosed chronic phase CML

HOSPITAL COURSE
- Malignant hematology consulted for patient’s presumed new diagnosis of leukemia
- Initial concerns:
  - Possible leukostasis, with the plasm GI bleed as a manifestation of a bowel infarct
  - TLS given patient’s significant splenomegaly, and elevated LDH and uric acid
- Bone Marrow biopsy confirmed chronic phase chronic myelogenous leukemia (CML)
- Started on nilotinib (a 2nd generation tyrosine kinase inhibitor)
- Team monitored electrolytes and renal function, and treated patient with IV fluids and allopurinol for hyperuricemia during first 72 hours of treatment initiation with nilotinib
- Patient’s hematocrit thought likely to be from a benign source, exacerbated by coagulopathy or platelet dysfunction related to his CML – he did not have any subsequent GI bleeding

DISCUSSION
- This case represents a new diagnosis of CML, presenting with marked hyperleukocytosis and a GI bleed concerning for leukostasis, as well as bulky disease demonstrated by massive splenomegaly and elevated LDH and uric acid, which are risk factors for development of TLS
- Both leukostasis and TLS are medical emergencies requiring immediate recognition and intervention

- Why this patient did not have leukostasis:
  - Leukostasis determined by predominance of blasts specifically, but the exact pathophysiology of leukostasis is unknown:
    - Likely multiple mechanisms at play
      - Viscosity – both the sheer volume of leukocytes, and the larger size and increased rigidity of immature blasts
      - Local hypoxia – due to high metabolic activity of blast cells
      - Cyclophosphamide and the oncostatic hormone that promote further blast cell recruitment

- Why this patient did not have tumor lysis syndrome (TLS):
  - While this patient presented with bloody disease, and an elevated LDH and hyperuricemia (both of which can be explained by the significant tumor burden in itself), he did not have other electrolyte abnormalities to suggest rapid cell lysis, his renal function was intact, an EKG showed normal sinus, and he was clinically well-appearing
  - TLS most commonly seen with non-Hodgkin lymphoma, acute leukemias, some fast-growing solid tumors
  - Although the patient’s electrolytes and renal function were closely monitored while initiating treatment, he was at a relatively low-risk (<1%) for TLS based on his diagnosis of chronic phase CML

KEY POINTS
- Leukostasis and Tumor Lysis Syndrome are oncologic emergencies
- Patients with acute leukemia with high blast counts are at highest risk for leukostasis
- Tumor Lysis Syndrome can occur after treatment or spontaneously

PHOTO CREDITS
- Figure 1: Case courtesy Hospital for Special Surgery, New York, New York, 2008
- Figure 2: "Chronic Myeloid Leukemia smear 2009-04-09" by Paulo Henrique Orlandi Mourao - Own work. Licensed under CC BY-SA 3.0 via Commons - https://phil.cdc.gov/phil/details.asp
- Figure 3: "Hyperleukocytic Leukemias: Rheologic, Clinical, and Therapeutic Considerations." Blood 1982; 60(2):279-283
- Figure 4: "Leukostasis and Tumor Lysis Syndrome are Medical Emergencies" by Molly J. Andreason MD, Katie Camilleri MD, Kyle Kent MD - Oregon Health & Science University, VA Portland Health Care System

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Relevant References:

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