Akal College of Nursing

Baru Sahib

Class Summary

**Date**: 11/12/15

**Time:** 12 to 1pm

**Class** B.Sc. Nursing IInd Year

**Subject:** Pathology

**Unit:** Clinical Pathology

**Topics: Bone Marrow**

**Bone Marrow**

* Bone marrow differentiates into myeloid, erythroid and lymphoid cell lineages under the influence of cytokines or growth factors.
* Function: supply mature hematopoietic cells into peripheral blood and respond to demands
  + Highly vascularized loose connective tissue
  + Organized around bone vasculature
    - Located between trabeculae of spongy bone
  + Composed of 2 major compartments
    - Hematopoietic
    - Vascular

**Indications for BM Evaluation**

* Hematological and nonhematological disorders often requires BM evaluation for
  + Diagnosing
  + Managing
  + Making prognoses
  + Following up on disorders
  + Bone marrow should be evaluated together with
    - Peripheral blood counts
    - Peripheral blood smear
* Indication for Bone Marrow Studies
* **Hematologic diseases**
  + Anemia, erythrocytosis, polycythemia
  + Leukopenia and unexplained leukocytosis
  + Appearance of abnormal or immature cells in the peripheral blood circulation
  + Thrombocytopenia or thrombocytosis
* **Systemic disease**
  + Solid malignant tumors elsewhere in the body - done at initial diagnosis to determine the degree of tumor spread and to stage the malignancy
  + Infections known as “fever of unknown origin” (FUO) in which organisms may be within the marrow.
  + Certain histiocytic diseases

**Bone Marrow Procedure**

* Sites of hematopoiesis
  + Differ by age
  + Certain disease states
    - Red marrow can extend into long bones
  + Cellularity within red marrow decreases with age
    - Adipose tissue replaces hematopietic tissue
* Marrow specimens
  + After adolescence
    - Posterior superior iliac crest
    - Occasionally sternum and anterior iliac crest
  + < 2 years of age
    - Anterior tibia
  + Older children
    - Spines of the lumbar vertebral bodies L1 and L2

**Role in bone marrow procedure**

* Provide necessary equipment
* Preparation of the specimen for analysis
  + Use sterile technique
  + Make direct smears from the aspirate
  + Make crush smears from the marrow spicules
  + Place extra aspirate into anticoagulated tubes
* Performance of the preliminary exam and processing
* Bone Marrow Equipment
* Bone marrow aspirates and biopsies
  + Obtained using disposable needles
  + *Jamshidi* trephine needle (8 or 11 gauge)
  + Sterile technique always used

**Processing the specimen in the   
lab**

* Place EDTA specimen (liquid aspirate) in Wintrobe tube and centrifuge at low speed.
* Measure layers formed by centrifugation
  + - * **FPV** - fat and perivascular
        + used for iron stain
      * **Plasma**
      * **Buffy coat** (myeloid:erythroid cells- M:E) Normal is 4:1. M:E is the ratio between all granulocytes and their precursors and all nucleated red cell precursors.
      * **RBC’s**
      * **Processing the specimen in the   
        lab**
* Prepare and stain ME smears.
* Deliver clot remaining in syringe and biopsy to histology for processing.
* Deliver other specimens obtained such as viral, fungal or routine culture specimens to microbiology.
* Complete paperwork and package specimens to be sent out to reference lab
* **Information derived from specimens**
* **Direct smear** from syringe tip - evaluation of cellular morphology with Wright’s stain
* **Particle (crush) smear** - evaluation of cellularity and the relationship of cells to each other
* **M:E smear** - evaluation of hematopoietic cells and M:E ratio

**Biopsy**

* + If marrow cannot be aspirated (“dry tap”), this is the only specimen for examination
  + Examination for malignancy for clinical staging of lymphomas and cancers
  + Examination of the architecture of the bone marrow and the cells in their natural relationship to each other
  + *Trephine imprint (*touch prep) - examination of cells with Wright’s stain; may be the only source to study cellular detail if an aspirate is not obtained

Submitted by

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ACN