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