Collaboration In the Laboratory

A case study of disseminated histoplasmosis by Laci Mallory, HT (ASCP)

OBJECTIVES

- Review Disseminated Histoplasmosis
- Evaluate Case Information
- Examine the collaborative efforts of the different Laboratory Departments in this case

Histoplasma

- Histoplasmosis is an infection as a result of exposure to the fungus Histoplasma capsulatum. The fungus is common and found in the soil, naturally occurring where there is larger volume of bird and/or bat droppings in the soil.
- In the United States, the histoplasma fungus thrives in the central and eastern portion of the country. Particularly surrounding the larger river valleys. Histoplasma capsulatum is common in Latin America. The fungus can also be found on other continents; including Africa, Asia, and Australia.

- *References*
  - *Centers for Disease Control and Prevention*
    - *https://www.cdc.gov/fungal/diseases/histoplasmosis/index.html*
  - *Mayo Clinic*
    - *https://www.mayoclinic.org/diseases-conditions/histoplasmosis/symptoms-causes/syc-20373495*

Image-
H&E Stain Visualizing Histoplasma

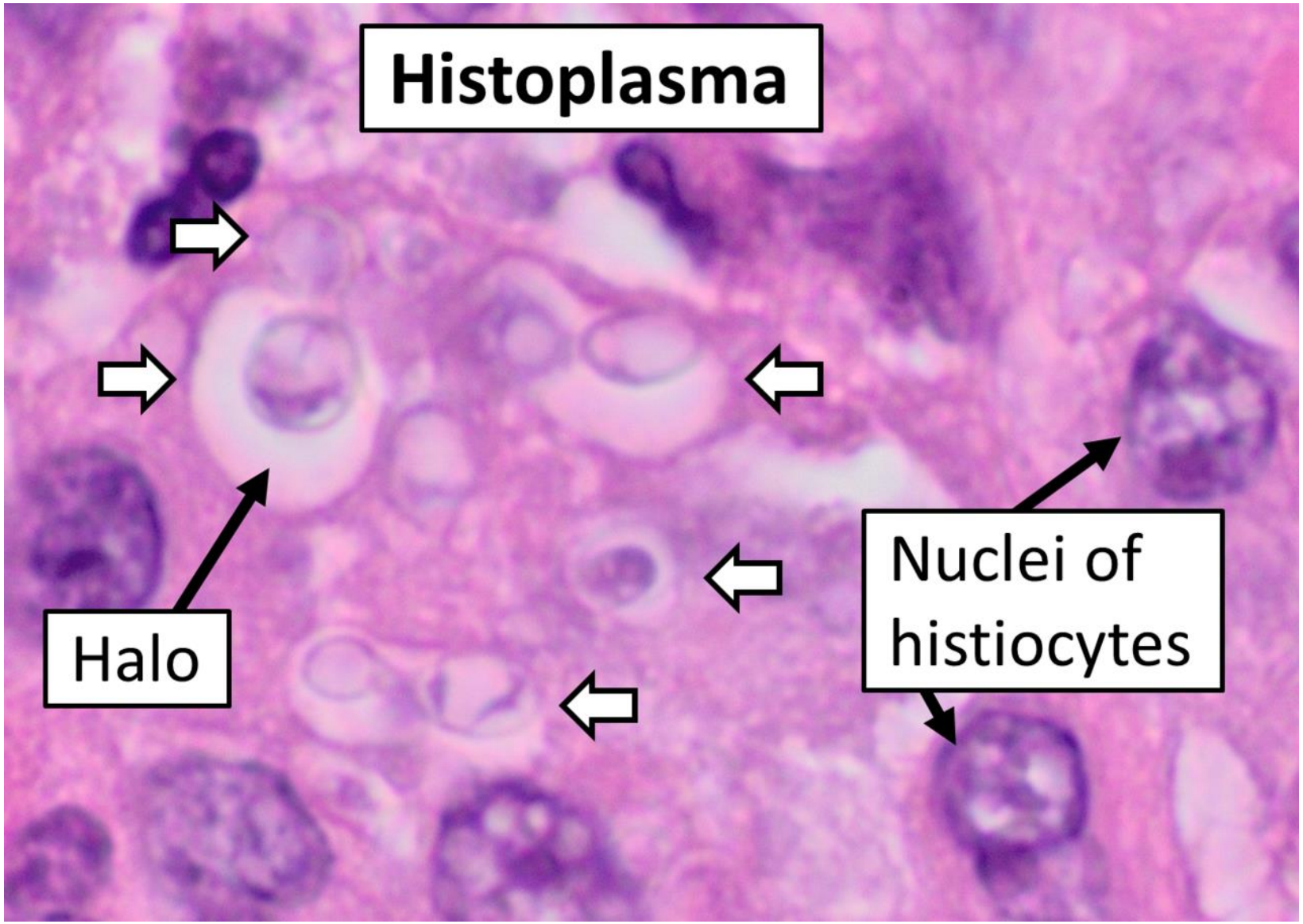


Image origination
Mikael Haggstrom, M.D.

Disseminated Histoplasmosis

- Histoplasma capsulatum is most commonly introduced into humans by breathing in the spores of the fungus.
- Accurate reporting on exposure rates is not available, likely due to the lack of symptoms in most people.
- Chronic Histoplasmosis can mimic tuberculosis symptoms, potentially delaying identification and care.
- In rare cases severe infection, called disseminated histoplasmosis occur and can be life threatening. DH typically occurs when histoplasmosis makes its way into the lymph nodes and travels to, infecting different organs.

Reference: Mayo Clinic

https://www.mayoclinic.org/diseases-conditions/histoplasmosis/symptoms-causes/syc-20373495#causes

Disseminated Histoplasmosis

- Symptoms typically appear 3 to 17 days after exposure and can include:
  - Fever and chills
  - Headache
  - Muscle aches
  - Dry cough
  - Chest Pain
  - Tiredness
- Occasional Symptoms
  - Joint pain
  - Rash
  - Weight loss
  - Bloody cough

Patient Information

Transfer request from outside facility

Sex: Female

Age: Early 30s

Race: Asian (Pacific Islander/Oceanic Adjacent)

Language: English is not first language

Occupation: Service Industry

History of Illness

- Presented in the emergency room with sister in law
- Shortness of breath x 2-4 weeks (chief complaint)
  - Associated cough and fever
- Reported weight loss, unsure of total
- Severe wheeze
- Hypoxic-O2 (82%) HR-128bpm BP-110s/50s
- Placed on 5L O2
- WBC 7.5 Hemoglobin 8 Hematocrit 26
- Lactic Acid 6
- Calcium 7.8
- CT shows cavitary pulmonary mass RLL
  - Diffuse Lymphadenopathy

Patient Information

Patient Medical History

- No medical history on file
  - Later updated to “No history of asthma or COPD”
- No surgical history on file
- No family history on file
  - Later updated to “no family history of malignancy”
- No current prescription medications
- No known allergies

Patient Social History

- Does not smoke
  - ICU staff reported possible vaping
- Does not drink
- Does not take recreational drugs
- Sister in law reports that the patient recently moved out of state.

Admission Information

Hospitalist Admission Notes

- Patient transfer from outside facility emergency department for shortness of breath, cough, and fever. Recently moved out of state. Family brought her home a couple of days ago because she was unwell. Continued to decline so they went to the emergency room.
- Patient is alert and oriented, shortness of breath, severe wheeze, febrile, remains tachypneic, and placed on BiPAP.
- Plan-Obtain cultures, labs, peripheral smear, imaging. Consult hematology/oncology, pulmonary, and surgery. Start vancomycin, monitor electrolytes and replace as needed. NPO in case of biopsy.
- Differential Diagnosis: Acute hypoxic respiratory failure (HCC), cavitary lesion of lung, lactic acidosis, normocytic anemia, thrombocytopenia, hyponatremia, and hypotension.
- Vitals
    - BP 103/59 Pulse 132 Temp 100°F Resp 36

Consultation Notes

- Hematology/Oncology consulted-peripheral smear and serum flow cytometry pending. Continue to monitor labs-could be reactive to sepsis and liver dysfunction vs. malignancy. If lymphoma confirmed, bone marrow will be needed to evaluate for involvement. Ordering iron studies, SPEP, B12, Folate
- Pulmonary consulted, TB unlikely. Plan to perform an EBUS/BAL to collect cultures and possible pathology specimen to definitively diagnosis extensive lymphadenopathy (surgery would be preferred for tissue collection if patient remains stable)
- Surgery was consulted, plan to perform an excisional biopsy of cervical lymph node

Post Consultation Information

- Imaging
  - Abdominal/Pelvis CT-Diffuse lymphadenopathy, Groundglass pulmonary opacities as well as multiple pulmonary nodules. Splenomegaly, Hepatomegaly with hepatic steatosis.
  - Neck/Soft Tissue CT-Diffuse cervical lymphadenopathy, interval worsening of bilateral pulmonary opacities.
  - Recommend clinical correlation
- Labs-Stable so move patient to Telemetry floor from ICU 24 hours after admission.
  - Persistent/increasing hypoxia after moving to the floor.
  - O2 requirements significantly worsening transferring back to the ICU, will be intubated, and central line placed. 36 hours after admission.
  - Pulmonary procedure to be performed after.

Collaboration in the Lab

- The Pathologists really brought the different Lab departments together with their involvement and efforts to correlate studies
  - Involvement included real time communicating with the Providers, and Laboratory Leaders about the patient status, scheduled procedures, and other Lab results
    - Hematology-Peripheral Blood Smear, Path Review
    - Microbiology-Positive Fungal Cultures, KDHE Report
    - Non-Gyn Cytology Interpretation
      - BAL scheduled wit Pulmonary-Patient decline discussed and case prioritized
      - Microbiology result communicated to Cytotechnologist and Pathologist STAT, led to the GMS and cell block being processed with priority
    - Blood Bank
      - Labs Reviewed-Product Orders Reviewed
    - Surgical Pathology-Interoperative Consultation, Permanent Section Interpretation
      - Microbiology and Cytology results communicated STAT
      - Surgeon communication about patient decline and emergent afterhours procedure
      - Coordinated with Histology Staff to process the tissue afterhours and receive GMS stain STAT

Labs At Admission

CMP

136-145	Sodium	129
3.6-4.9	Potassium	3.7
99-111	Chloride	105
20-36	CO2	20
7.0-16.0	Anion Gap	7.7
74-106	Glucose	109
5.7-8.2	Total Protein	5.7
3.4-4.8	Albumin	2.2
8.3-10.6	Calcium	7.3
6.0-20.0	BUN, blood	13
0.40-1.10	Creatinine	0.43
>59	EGFR	>59
<=1.2	Total Bilirubin	1.2
29-122	Alkaline Phosphotase	243
10.0-46.0	ALT	19
16.0-37.0	AST	71

CBC

3.5-10.5	WBC	5.4
3.90-5.03	RBC	3.12
12.0-15.5	Hemoglobin	8.4
34.9-44.5	Hematocrit	26
81.6-98.3	MCV	83.3
26.0-34.0	MCH	26.9
31.0-37.0	MCHC	32.3
40.0-55.0	RDW-SD	57.8
11.9-15.5%	RDW	20
150-450	Platelets	57
%	Immature Platelet Fraction	7.1
<=0.00	nRBC	0.02
40.0-75.0%	Neutrophil %	90.4
22.0-49.0%	Lymphocytes%	4.4
2.0-10.0%	Monocytes%	4.8
<=5.0	Eosinophils%	0.2
0.0-2.5	Basophils%	0.2
1.70-7.00	Neutrophils Absolute	4.88
0.90-2.90	Lymphocytes Absolute	0.24
0.30-0.90	Monocytes Absolutle	0.26
0.05-0.50	Absolute Eosinphils	0.01
0.00-0.30	Basophils Absolute	0.01
<=0%	%nRBC	0

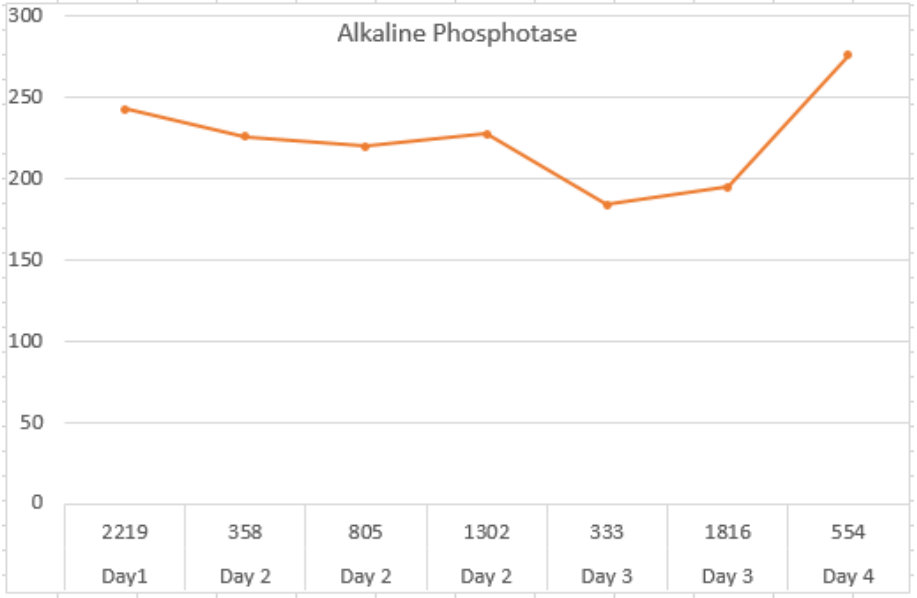
ABG

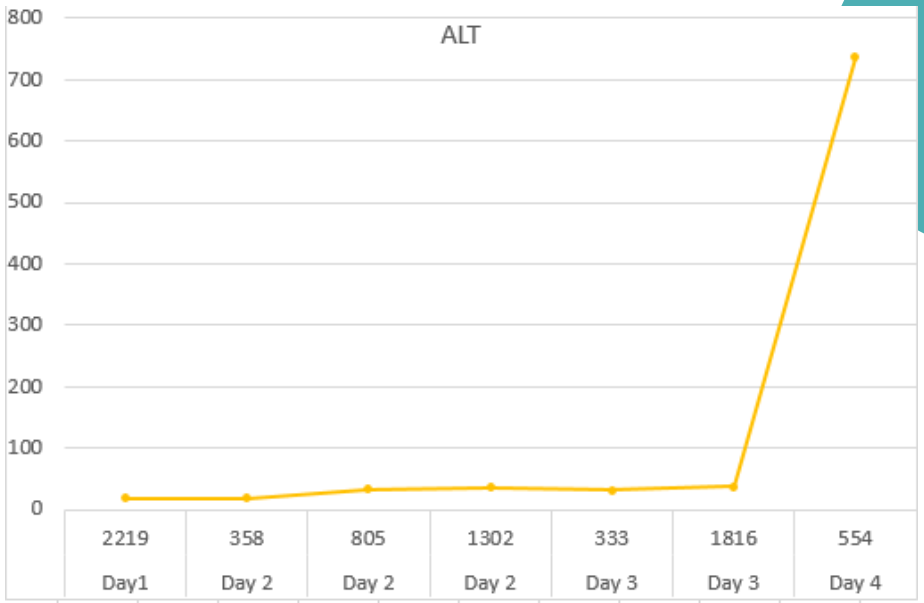
7.35-7.45	pH, Arterial	7.46
36-50	pCO2, Arterial	27
80-104	pO2, Arterial	70
(-3)-3	Base Excess, Arterial	-4
94-100%	O2 Sat, Arterial	96
23-27	HCO3, Arterial	19

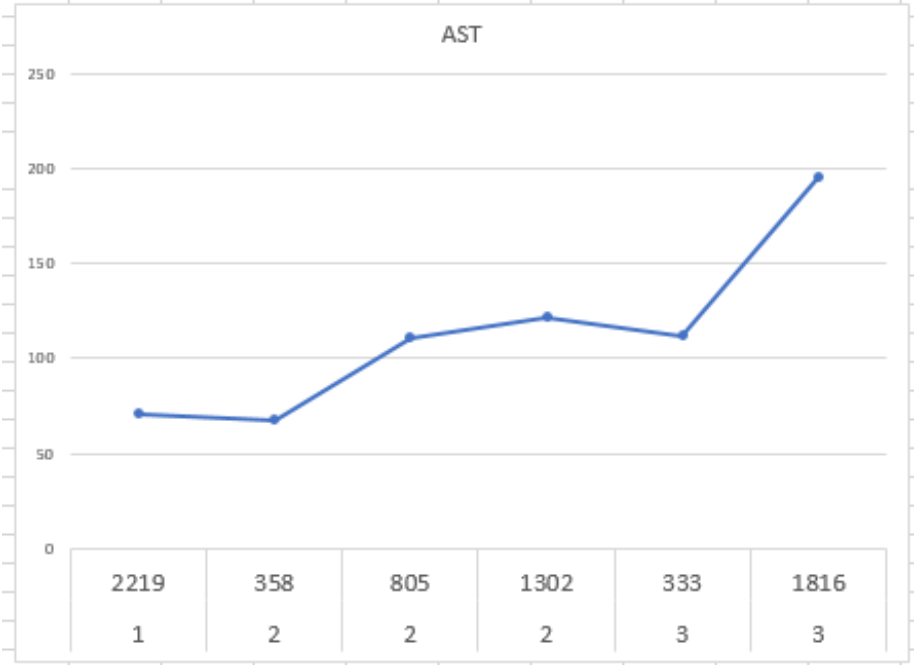
1.6-2.3	Magnesium	2
0.7-2.00	Lactic Acid	1.9
2.7-4.5	Phosphorus	4.2

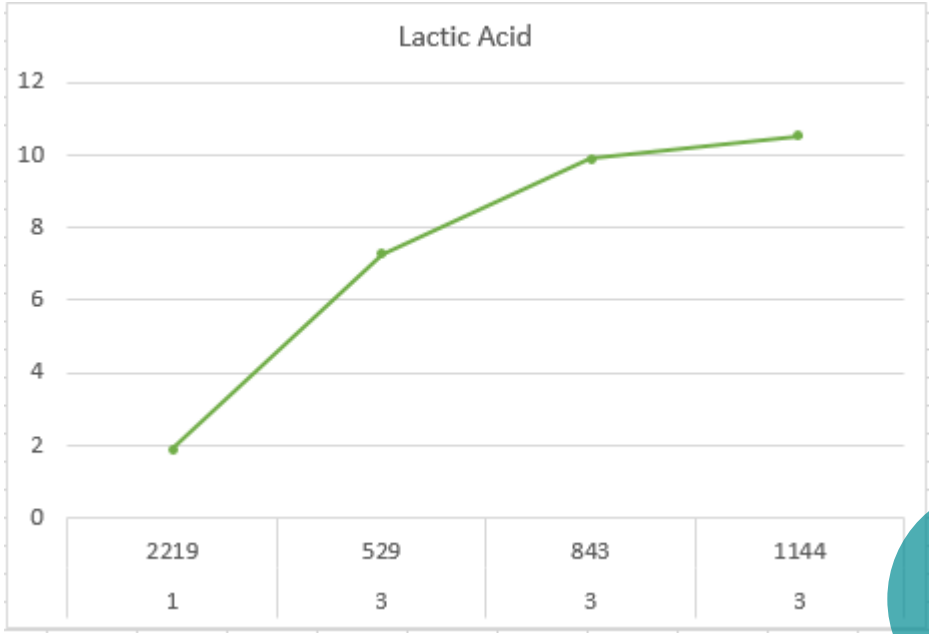
- Blood Cultures-No growth after 5 days
- Resp Panel PCR Panel-Negative

Sample of Labs over LOS(4 days)

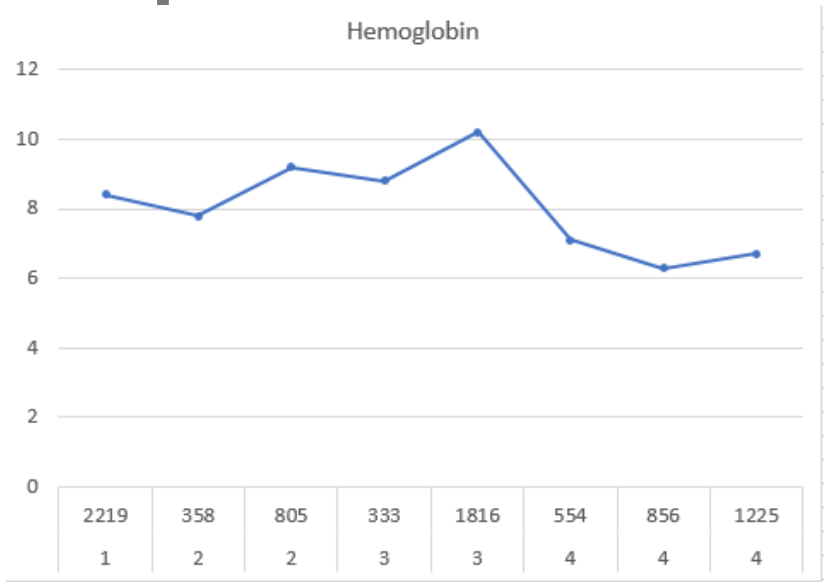


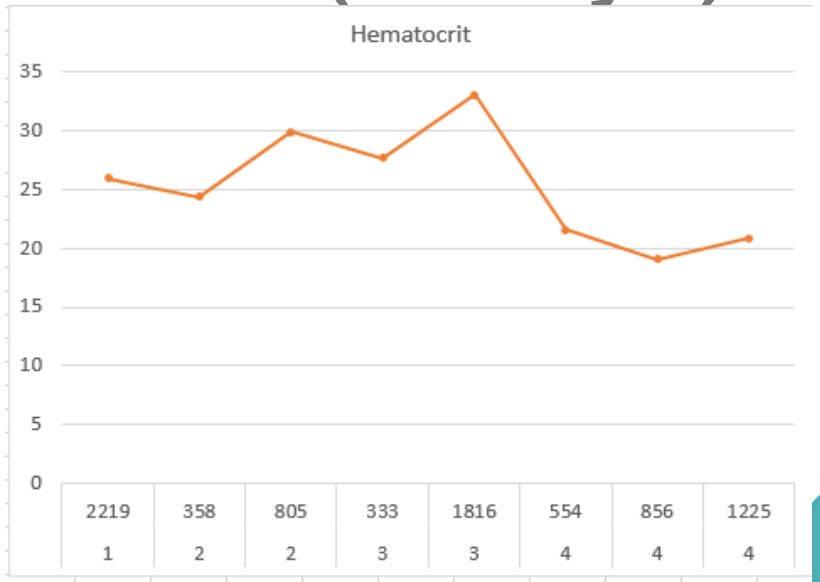


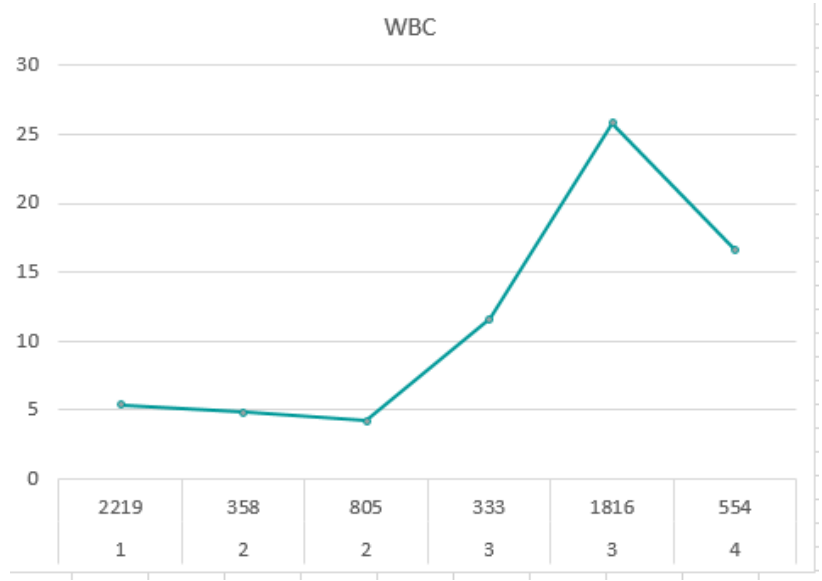


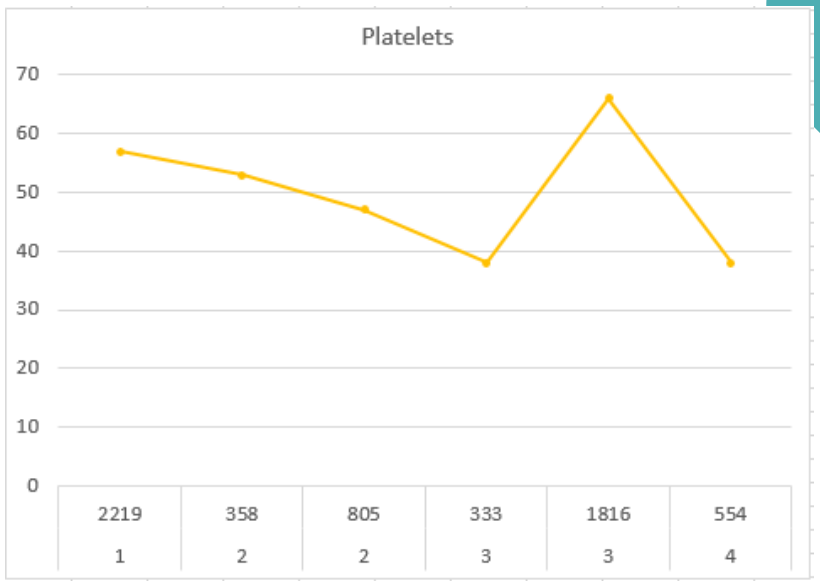


Sample of Labs over LOS(4 days)









Continued-Sample of Labs during LOS (4 Days)

Microbiology/Pathology

- Day 2
  - BAL: Respiratory and Fungus Culture (+) Histoplasma Capsulatum; AFB (-)
  - Tissue: Aerobic and Fungus Culture (+) Moderate Histoplasma capsulatum
- Day 3
  - Non-Gyn Cytology (R, BAL)
    - GMS (+) Histoplasmosis
    - No Malignancy
  - Tissue Exam (Cervical Lymph Node)
    - GMS (+) Histoplasmosis
    - Evidence of necrotizing granulomatous lymphadenitis

Coagulation Studies

- Day 2
  - PT-13.5 (Range 10.2-13.2 seconds)
  - INR-1.15 (Range 0.85-1.12)
- Day 3
  - APTT-36.6 (Range 25.1-36.5 sec)
  - Fibrinogen-125 (Range 200-393)
  - INR-1.25 (Range 0.85-1.12)
  - PT-14.6 (Range10.3-13.2 seconds)

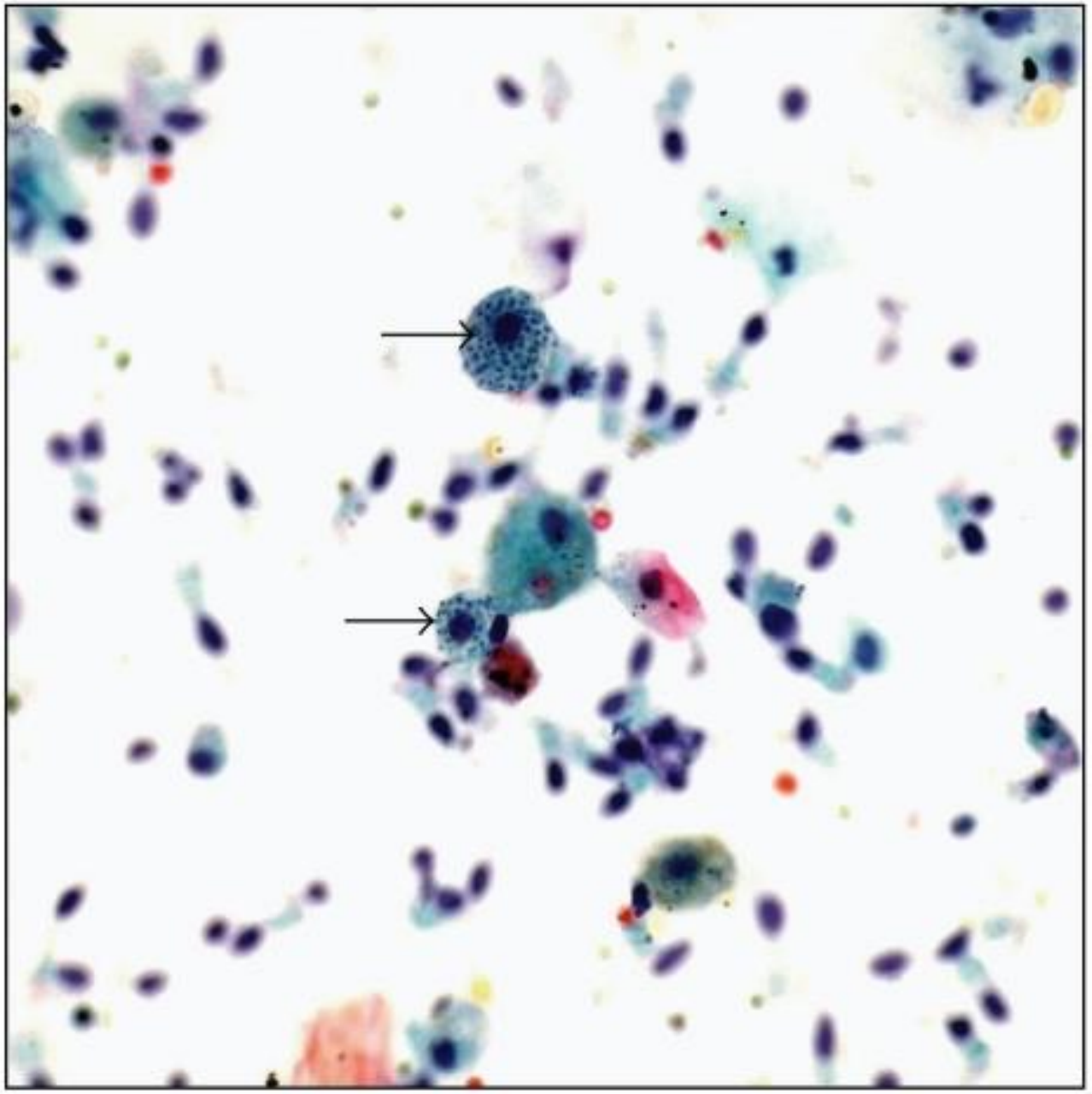


Image from Researchgate.net

- Bronchoalveolar lavage, BAL with histoplasma organisms (arrows) present within macrophages
- (ThinPrep, Pap stain, high magnification).

Reference:

TY - JOUR
AU - Lang, Tee
AU - Monaco, Sara
AU - Michelow, Pam
AU - Pantanowitz, Liron
PY - 2011/04/07
SP - 256083
T1 - Review of HIV-Related Cytopathology
VL - 2011
DO - 10.4061/2011/256083
JO - Pathology research international

BLOOD BANK

- Day 4
  - ABO Rh- ***A Pos***
  - Antibody Screen-***Negative***
  - TEG ACT-596 seconds (86-118 seconds)
  - Angle-8.0 (64.0-80.0 degrees)
  - MA-10.3 (52.0-71.0mm)
  - LY30-0.0% (0.0-8.0%)

- Total Blood Products Given
  - Cryo-15 Units
  - Plasma-5 Units
  - Platlets-2 Units
  - RBC-2 Units

Patient Outcome

- Unfortunately, even with the interventions and efforts of each discipline the patient did not survive.
- The teams involved in the patient's case are left with more questions than answers but will hopefully carry the knowledge of this case with them and it may provide insight in a future case.

Q&A

THANK YOU