Cytology as a Diagnostic Modality in the Autopsy Suite

It isn’t Just for the Warm and Breathing Anymore

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Why Do It?

• Improve accuracy of Provisional Autopsy Report
• Make gross autopsy conference (organ recital) more interesting & educational
• Diagnose infection without contamination of cryostat
• Reach areas that cannot be opened with the scalpel for culture and morphologic evaluation
• Help decide what special stains/studies need to be requested
• Combination of Papanicolaou and Romanowski are great for infectious pathogen diagnosis
How it all Started

Autopsy 1992: 62-year-old man with *Staphylococcus aureus* endocarditis on ventilator for ARDS.
White, rough 1cm lesion on right true vocal cord.
? Intraepithelial neoplasia; Scraping done!
Cytology in the Autopsy Suite is Cool!

Laryngeal lesion section
Cytologic Techniques in the Mortuary

- Scraping
- Touch Preparation
- Fine-needle aspiration
  - Direct smear preparation
  - Saline rinse with cytospin preparation
Focal Lesions in Cut Organs
Direct Scrape Technique

Scrape lesion with edge of scalpel and dot slide near label end.

Gently press dot of material with second slide and pull second slide toward end of slide containing tissue fluid.
USE FNA TECHNIQUE TO EVALUATE:

- Diffuse lung consolidation
- Palpable masses in uncut organs
- Soft or suspect areas in brain
- Cystic lesions
Diffusely firm or heavy lung, FNA can be done from uncut lung and cytospin preparations made. Use the same technique as for peripheral FNA, only one can change the direction of the needle at a wider angle while aspirating. Rinse in 2-3 cc saline, vortex and prepare cytocentrifuge slides.
Two different lungs, each with diffuse consolidation from HIV patients

P. jiroveci, Romanowski stain

CMV, Papanicolaou stain
Needle-like crystals suggestive of uric acid
Diagnosis: Gouty arthritis of elbow

- Negative birefringence: Uric acid crystals
  - Slow Vibration direction
Bilateral swollen knees
FNA done with material sent for culture and cytology

Acute inflammatory exudate; Culture: *Candida albicans*
Diagnosis #1: Septic arthritis and polarizable crystals
Spleen; Normal

Spleens: Abnormal
Normal Spleen: Lots of lymphocytes
Curdled Milk Spleen: *Coccidioides immitus*
Acid fast bacilli, especially, but not only MAC, can be seen as negative images (upper center) or refractile, reddish bacilli (upper right) on Romanowski stain. Kinyoun acid fast stain is seen in lower left.
Weird Cytodiagnoses
From the Galveston Coast Autopsy Suite
A 27-year-old man was found unresponsive by an acquaintance who called 911 and left the scene. Pathologists were given history that the decedent had HIV/AIDS, cryptococcal meningitis and had been undergoing a “sex change procedure”.

Criminially Induced Oleopygia
Lips

And Hips
Clear material admixed with blood was oozing from the lateral aspects of both hips.
Post-mortem FNA of right hip: Macrophages filled with empty vacuoles
Cryptococcus in lung aspirate from different patient
FNA of uncut lung:
Close up of lung FNA

Looks like patient had been injecting stuff into hips and had stuff in lungs
Also, patient had two 1 cm caseous lesions in left lower lobe of lung!
Two 1 cm caseous-appearing lung nodules seen grossly. Scraping done! Papanicolaou Romanowski Pulmonary Cryptococcosis
Brain was not particularly remarkable at autopsy. Touch preparations of meninges and cortex were done.
Diagnosis: Cryptococcus meningitis
Pulmonary vessels full of oily liquid.
Lipoid material seen within alveolar capillaries (upper left), interstitial macrophages (upper right) and intra-alveolar macrophages (lower right)
Brain sections taken after brain cutting
Diagnosis; Cryptococcal meningitis
Autopsy Diagnoses

- Massive oil embolism owing to illicit injection for hip augmentation
- Silicone documented by chemical analysis
- Criminally induced oleopygia
- Cryptococcal meningitis
- Focal cryptococcal pulmonary nodules

Autopsy faculty prosector: Pier Luigi Dipatre, M.D.
1. A 51-year-old male decedent
2. History of hepatitis C and steroid therapy for glomerulonephritis
3. Developed *S. aureus* kidney infection with bacteremia following a kidney biopsy
4. Later found to have aortic valve vegetations
5. Underwent 2 courses of antibiotic therapy for presumed *Staphylococcus* endocarditis.
6. Presents with severe pancytopenia, DIC and ARDS
7. DIES
Organized vegetations present on ventricular surface of all three aortic valve cusps. Largest seen on right coronary cusp. The largest was scraped with a scalpel and a Romanovski-stained smear was made.
Rapid Romanovski “Diff Quik” stain of heart valve vegetation scraping.
Based on cytologic findings, we

1. Informed the microbiology laboratory that we suspected histoplasmosis and

2. Cultured the decedent’s spleen with request for fungal pathogens

3. Requested that the laboratory HOLD the only remaining antemortem blood culture

( Antemortem blood cultures had been submitted for bacterial cultures only and discarded after 1 week)
Final Diagnoses

- Spleen and retained antemortem blood culture grew *H. capsulatum*
- Aortic valve had fibrinous vegetation containing abundant yeasts
- Yeast found in liver, spleen and lung
- Cause of pancytopenia, DIC and DAD found in bone marrow!
Lagniappe! Infection associated Reactive Hemophagocytic Sydrome = cause of death!
The Search for the Boxed Jelly

A 4-year-old child dies shortly after swimming in the gulf of Mexico near Galveston. Tentacles of a jellyfish are found wrapped around the child’s arm. At autopsy, the pediatric pathologist scrapes regions of discoloration resembling tentacles marks on the boy’s arm. Does not know what else to do so sends the scraping to cytopathology.
Skin scraping, Papanicolaou stain: Large, elongated nematocysts
Skin scrapings, Papanicolaou stained: Keratin and nematocysts
Nematocysts images were sent to a jellyfish expert, who identified the perpetrator as: *Chiropsalmus quadrirmanus*, a box jellyfish. Was he right???

Mad Cytopathologist collects Texas Gulfcoast Jellies and makes Papanicolaou stained smears of nematocyst scrapings
What Kind of Jelly???
Find the Perpetrator Coelenterate

- Portuguese Man of War (*Physalia physalis*)
- Sea Nettle (*Chrysaora quinquecirrha*)
- Sea Wasp (*Chiropsalmus quadramanus*)
- Cabbage Head (*Stomolophus meleagris*)
- Moon jelly (*Aurelia aurita*)
Which Jelly did it? Pap stains of nematocysts from gulf coast coelenterates are seen.
Physalis physalia
Portuguese Man of War
Chrysaora quinquecirrha
Sea Nettle
Stomolophus meleagris
Cabbagehead
Chiropsalmus quadramanus: Sea Wasp
Diagnosis: Fatal jellyfish envenomation associated with *Chiropsalmus quadramanus*
5. Viral Hysteria on the High Seas

A sailor died aboard ship returning from West Africa. Fear spread that he died of viral hemorrhagic fever. Ship was quarantined, and sailor autopsied in the Galveston Co Medical Examiner’s Office. He had an enlarged, slate grey spleen. Touch preparations of spleen were made.
Romanowski stain of spleen touch preparations (above) and blood (left)
Businessman who died suddenly while working in Brazil
Cerebral falciparum malaria
Autopsy Cytopathology

- Fun
- Educational
- Weird
Selected References