Digital Pathology: Real Examples, not Just Promises for the Future

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The need for a “helping hand” is not limited to surgical pathology

- Difficult problems in Pathology can occur in all areas of our Specialty including:
  - Cytology
  - Medical Microbiology
  - Body Fluids (CSF/Pleural/Abdominal/Pelvic/Urine/Etc)
  - Hematology
  - Many Others (Vitreous/Joint/Etc)
New technologies can bring more than just words to our communities

• The Internet and other technologies enable us to communicate with each other anywhere in the world and the communication is fast
• Other technologies and our global economy have also enabled millions of people to travel rapidly to many more places
• We now can see patients regardless of where we live with unusual diseases not native to our communities
• This means that pathologists/microbiologists/infectious disease and public health professionals increasingly need knowledgeable consultative specialists to be available to help with patient care
Numerous QA Studies in Anatomic Pathology

This study highlights the importance of a review system in detecting errors in surgical pathology reporting.

Recognition of the fact that surgical pathology is not infallible has improved the end product. It has also minimized interobserver variability in the department, resulting in a uniform approach among the pathologists to histological reporting.
John Tomaszewski, MD, FASCP

Second Opinion in Diagnostic Surgical Pathology and Cytopathology: An Overview. A recent IOM report focused a community-wide discussion on patient safety in the delivery of health care. Expanding knowledge about patient safety, raising expectations for improvement of patient safety, enhancing data collection about safety issues, and creating systems within organizations, which improve patient safety, are focus points in the IOM 4-tier approach toward enhancing patient safety. Second opinion in anatomic pathology is 1 mechanism for error reduction by redundancy. Second opinion is an integral part of many aspects of a total QA program in anatomic pathology.

Variance in anatomic pathology can be the result of several factors, including operational errors, lesion heterogeneity, poorly stated criteria, ambiguous qualitative terms, imprecise qualitative terms, cognitive mistakes, or difficult diagnoses. The landscapes on which error occurs are detailed and heterogeneous. A precise definition of error-prone landscapes would allow for logical answers to the questions of which patients and which clinical settings are best served by second opinion activities.
Our strategy is to liberally obtain additional opinions. Obtaining one or more additional opinions is critical component of due diligence.

…and shows the referring clinician and the patient (his or her family) that an effort has been made in good faith to arrive at the best possible diagnosis.

-For the most challenging ... we invariably put two or more signatures to the pathology report and frequently seek expert
Digital Pathology use for QA in Brazil

REVIEW

Digital slides: Present status of a tool for consultation, teaching, and quality control in pathology

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Received 26 February 2009; received in revised form 6 April 2009; accepted 12 May 2009

Abstract

In the last few years, telepathology has benefited from the progress in the technology of image digitalization and transmission through the world web. The applications of telepathology and virtual imaging are more current in research and morphology teaching. In surgical pathology daily practice, this technology still has limits and is more often used for case consultation. In the present review, we intend to discuss its applications and challenges for pathologists and scientists. Much of the limitations of virtual imaging for the surgical pathologist reside in the capacity of storage of images, which so far has hindered the more widespread use of this technology. Overcoming this major drawback may revolutionize the surgical pathologist’s activity and slide storing.

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Improved communication: getting the right information to the right people at the right time to make the right and safe decisions

- Clinical decision support systems such as prompts, alerts, range settings, automated surveillance and use of robotics
- Greater use of simulation technologies as part of education and training programmes and effective team working
- Technology to improve the design and safety of health care processes such as electronic health care records and patient identification systems
- Medication safety management including computerized order entry systems; Smart
- Computerized notification, monitoring and tracking of critical and abnormal test results
- Facilitating the routine assessment of safety and the recording of errors and harm
Challenges Exist in Identification of Microbes

Challenges and Pitfalls of Morphologic Identification of Fungal Infections in Histologie and Cytologic Specimens
A Ten-Year Retrospective Review at a Single Institution

Ankur R. Sangoi, MD, William M. Rogers, MD, Teri A. Longacre, MD, Jose G. Montoya, MD, Ellen Jo Baron, PhD and Niaz Banaei, MD

1. Presented in part at the College of American Pathology Society Meeting, September 2008, San Diego, CA
BAL from a 42 year female transplant patient

Cryptococcus in BAL 20x

Thanks to: Rodolfo Laucirica MD Pathology
Capsulated Yeast in Spinal Fluid

Thanks to Arthur Cohen Presbyterian Pathology Charlotte, NC
Cryptococcus with Ruler and Magnifier
Cryptococcus with 2X Magnifier
52 year old HIV male patient with radiologic findings suspicious of Tuberculosis

Cell block preparation of an FNA 40x

Thanks to: Rodolfo Laucirica MD Pathology
Colon Biopsy: History of colitis. Microbiology culture with White Fluffy Mold growing

Thanks to: Peter Gilligan and John Woosley UNC Pathology Chapel Hill
FNA Lung: 13 year old Latin American male presented with multiple lung lesions

Paragonimus

Paragonimus
32 male patient with AIDS who presented with an abscess in the right lung: FNA of Abscess

Department of Pathology Ben Taub General Hospital
Thanks to: Rodolfo Laucirica MD Pathology
25 year old male transplant patient with multiple lung lesions: FNA

Cytomegalovirus 10x

Cytomegalovirus 20x

Department of Pathology Ben Taub General Hospital
Thanks to: Rodolfo Laucirica MD Pathology
25 year old male transplant patient with multiple lung lesions: Aspergillus from BAL

Thanks to: Rodolfo Laucirica MD
26 year old female AIDS patient with ground glass changes on CT. BAL

Pneumocystis carinii

Pneumocystis carinii

Thanks to: Rodolfo Laucirica MD
43 year old female patient with ground glass changes on CT: BAL

Histoplasmosis capsulatum

Thanks to: Rodolfo Laucirica MD
35 year old male with multiple lung nodules

Thanks to Dr Arthur Cohen Presbyterian Pathology Charlotte NC
35 year old with multiple lung nodules

Fungal Silver Control

Histoplasma capsulatum

Thanks to Dr Arthur Cohen Presbyterian Pathology Charlotte NC
Digital Pathology provides the Ability to Review Atypical Blood Smears and Body Fluids

Abnormal Peripheral Smear (RBC)

Abnormal Peripheral Smear (RBC & WBC)
Abnormal Red Cells
Malaria Can be Seen Anywhere

- *m. falciparum*
- *m. vivax*
- *m. ovale*
- *m. malariae*
What parasite is This?
What does this peripheral smear suggest?
Canadian Healthcare Technology, Vol. 15, No. 7, October 2010

Telepathology poised for rapid growth

By Paul Brent

“Faster, better and cheaper,” is the promise of a telepathology pilot network currently operating between Toronto’s University Health Network and a number of rural and northern Ontario hospitals.

The first such system of its kind in the province, the network links physicians in remote locations to UHN’s roster of 45 pathology specialists in real-time via the Internet, instantly transmitting digital images of tissue samples.

The goal of the network is to give physicians access to the resources of big-city hospitals, regardless of the size of their facilities.

“It is more than just about the technology,” said Dr. Sylvia Asa, medical director of the Laboratory Medicine Program and pathologist-in-chief at UHN, who stressed that patients are the immediate beneficiaries of the new network. “Faster, better, cheaper is what I like to say. We are getting samples faster, we are producing better results and it is actually cheaper for the people of Ontario.”

The project has been strongly supported by Canada Health Infoway, the provincial government’s OntarioBuys program and eHealth Ontario.

Telepathology promises to improve the current system, which often relies on a general pathologist who serves one or several remote hospitals and must often send off tissue samples from challenging cases to city laboratories.

With turnaround times of at least 48 hours, that makes intra-operative consultations all but impossible – meaning more patient visits and delays for critical treatment.
Digital Pathology Can Help Make Quality Assurance more Efficient, Lower Risks, and Produce Better Outcomes

- Do not have to wait for last pick up of the day
- Eliminates many handling steps
- Available for patient care around the clock
- Ensures access for consultative help
- Demonstrates due diligence
- **Empowers** onsite pathologist with immediate “lifelines”
- **Enhances** image of institution
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People must help one another; it is nature's law.

Jean de La Fontaine