Cytopathology + More | Telecytopathology's potential starting to be seen

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August 2015—There is a growing body of literature referencing the uses of telecytopathology in clinical care. Telecytopathology is the interpretation of cytopathology material at a distance using digital images. It can be subdivided into three basic applications: rapid on-site evaluation (ROSE), primary specimen diagnosis, and second opinion consultation. Although there is a long history of attempts at implementing telecytopathology for broad clinical use, it still has limited but important applications in patient care.

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The technology has improved from low-grade video quality images to higher-grade static digital images and, more recently, whole-slide imaging with submicron resolution scanning capabilities. Still, the nature of cytology material itself, in terms of quantity and often quality of cells that can be imaged and viewed at a distance, remains a challenge. Cytology material often is not as uniform as formalin-fixed, paraffin-embedded tissue in terms of thickness for focusing, and cells with three-dimensionality may be spread across an entire slide compared with conventional histology processing. The use of multiple stains to detect subtle features, such as Papanicolaou and Romanowsky in tandem, may increase the number of slides to be viewed and limit the use of digital pathology techniques for timely assessments.[1]

While fine-needle aspiration is not a new technique, recent developments in advanced imaging, molecular testing, and targeted therapy have coincided with a rapid rise in the number of FNA procedures being performed.[2] Consequently, the demand for ROSE has also increased, outstripping the capacity of available cytopathologists at many institutions.

Telecytopathology is being increasingly used by cytotechnologists and cytopathologists to support ROSE procedures. The technology has been demonstrated to reduce the need for an on-site cytopathologist while still ensuring that pathology support is available and adequacy and triage determinations lead to the appropriate handling of aspirates and core biopsy material.[1,3,4] Recent literature suggests that when implemented with sufficient training on the application, telecytopathology can be an effective technology for "telecytopathologists" with remote cytotechnologists for determining adequacy and reducing the nondiagnostic rate for many specimen types, including but not limited to thyroid and endoscopic ultrasound-guided FNA procedures.[5,6]

The ability to support remote office settings and imaging departments in which cytology specimens may be collected at a distance from the pathologist and cytology departments for immediate evaluation is critical to the cytology community. Being able to provide appropriate, timely assessment that is minimally disruptive to the workflow of the department and the people who provide these services will become more important as patients are

cared for in larger integrated health care delivery systems where members of the health care team are at greater distances from the patient and provider.

The telecytopathologist can also provide immediate support for an on-site cytotechnologist or cytopathology fellow at time of collection. In addition, all members of the team who are caring for the patient can collaborate with colleagues during the procedure without all team members having to be on site. Disruption to cytopathologist workflow is minimized, as is diagnostic error because of the greater capability to have multiple simultaneous reviewers for consensus opinion.

Telecytopathology continues to be an evolving area of telemedicine. Guidelines for primary opinion and secondary review telecytopathology should be driven by best practices in conventional laboratory procedures with an understanding of the legal and regulatory environment in your locations and institutions to ensure safe, quality patient care protocols. More than ever, pathologists work in central offices geographically separated from the clinics in which cytology and surgical samples are obtained and the histology laboratories in which cytology preparations and tissue are processed and slides are made. As pathology becomes more subspecialized and pathologists become more engaged in practice situations in which they may not be in a centralized laboratory location, telecytopathology can be a useful tool.[6]

The practice of cytology is evolving, and cytologists must prepare now for the digital tomorrow. In the coming years, several changes such as the advancement of precision medicine, adoption of image standards, and emergence of technological advances such as digital pathology will greatly affect how a cytologist performs his or her job. Early efforts to use digital images and the Internet to provide diagnoses via telecytopathology have shown promise despite suboptimal older technology that was restricted initially to reproducing only a tiny fraction of the material on a glass slide. Whole-slide imaging offers the prospect of true virtual microscopy and may in time even replace glass slides in routine practice. We are rapidly approaching this reality as vendors continue to build newer, faster, and cheaper scanners with sophisticated software to improve digital pathology workflow. Telecytopathology's potential is only just beginning to be realized. Cytologists can look forward to accessing, reviewing, sharing, and even analyzing the digital data in their digitized slides.[1]

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