The Importance of Neuroimaging

Rapid assessment and advanced diagnostics are made possible by advances in neuroimaging.

Historically, neurologists have prided themselves on long and thorough clinical assessments—sometimes hours long—for conclusive diagnosis. Sadly, for many diagnoses there were no effective forms of treatment, although that is also changing. Today, we have well and truly entered a new age of neurology, in which rapid assessments and advanced diagnostics play a key role in effecting favorable outcomes for many conditions. Imaging in neurology has become a very vital tool essential to achieving such outcomes.

The accepted standards of clinical practice in the western world use imaging as a decision-making tool in stroke, neurooncology, and neurotrauma. Newer applications of existing imaging enhance clinical assessment in neuromuscular and movement disorders. Cutting edge improvements in imaging are integral to intervention and prognostication for neurooncologic and neurocritical care. The interest and investment from the giants in technology research and development result in new imaging modalities continually being introduced. Thus, it is our job as clinicians to keep up with these new tools, learning and understanding how to use them effectively.

In this issue, we begin with a basic review of imaging findings in neurotrauma, with Collin Herman and Chesney Oravec (with my help) putting together a thorough primer, bound to be helpful to emergency physicians and intensivists, as well as neurologists and neurosurgeons. Although newer CT and MRI tools are becoming available, a foundation in emergent imaging promises to improve outcomes for neurotrauma.

Acute-stroke care is an area where progress has been made by leaps and bounds. New thrombectomy and intervention trials have drastically changed the outlook for otherwise dismal conditions. The RAPID CT perfusion imaging has been a game changer, and Brady Laughlin and colleagues under the purview of Parham Moftakhar clarify the nuances of the technique, while offering the reader pearls and pitfalls to the interpretation of RAPID scans.

Ultrasound as a tool has existed for decades, but only recently has it been accepted as an extension of our senses, so to speak, when it comes to clinical assessment. Emergency and critical care physicians swear by it, and neuromuscular experts have made it a valuable weapon in their arsenal. Jared Hollinger and Vanessa Baute tell us about the applications of ultrasound in the early and accurate diagnosis of various nerve and muscle pathologies.

Our best technologies are still put to the test when it comes to the biggest malady known to human-kind, cancer. Newer MRI sequences are now widely available—knowing the scope of these is vital to decision making in diagnosis, treatment, and prognostication. Mona Shahriari comes together, once again with Parham Moftakhar to elucidate these sequences and make the reader aware and comfortable with what might otherwise remain radiology mumbo-jumbo.

Finally, we have an informative report from dementia expert Mary Koran about the usefulness of imaging for understanding dementia. Although clinical and behavioral testing remain the cornerstones of dementia diagnosis, imaging and serum and cerebrospinal fluid markers are becoming important. Of particular interest is positron emission tomography (PET) using radiolabeled tracers that help characterize brain regions affected, thereby altering prognosis. With new research in the field, imaging will likely hold the key to early diagnosis and hopefully, the development of disease-modifying treatment.

This issue is by no means a comprehensive review on all imaging modalities in neurology. But we sure hope it makes the reader aware and comfortable when ordering and interpreting scans.

My thanks to all the contributors and Anne M. Sydor, editor-in-chief of Practical Neurology for their efforts in making this happen. We hope our readers find this to be a useful resource.

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