NEURORADIOLOGY

COMMENTARY

All 4 abstracts for this issue are related to stroke. With the increasing use of rTPA for acute ischemic stroke there is recognition that a subset of patients would be better managed with endovascular techniques to re-establish brain perfusion. This has led to an increasing interest in the endovascular management of stroke. The pair of review articles from the April and May issues of American Journal of Neuroradiology focuses on this. The first of the articles deals with the technical side of the equation; the pharmaceutical agents as well as the mechanical devices. The second more importantly reviews the evidence for their efficacy. Both reviews are very comprehensive and are essential reading for all stroke neurologists and neuroradiologists.

The third abstract is a systematic review of the data to support the current wisdom that the lesion as seen on the diffusion weighted imaging represents the irreversibly infracted tissue. This all of us take to be the absolute truth but is it? There is disturbingly little high quality evidence to support this widespread belief.

The final abstract provides some support for the current practice of subjecting all patients with intracranial hemorrhages to CT angiography (CTA). The study demonstrates that CTA is both sensitive and specific for the causes of these hemorrhages.

ZAFAR SAJJAD
Associate Professor, Interim Chair,
Department Of Radiology,
Aga Khan University

Am J Neuroradiol 30:649-661, April 2009

R.G. Nogueira,[a,b] L.H. Schwamm[b] and J.A. Hirsch[a]

[a] *Endovascular Neurosurgery/Interventional Neuroradiology Section, Department of Neurology, Massachusetts General Hospital, Harvard Medical School, Boston, Mass*
[b] *Departments of Radiology and Neurosurgery, and Neurocritical Care and Vascular Neurology Section, Department of Neurology, Massachusetts General Hospital, Harvard Medical School, Boston, Mass*

ENDOVASCULAR APPROACHES TO ACUTE STROKE, PART 1: DRUGS, DEVICES, AND DATA

SUMMARY: Despite years of research and pioneering clinical work, stroke remains a massive public health concern. Since 1996, we have lived in the era of US Food and Drug Administration-approved intravenous (IV) recombinant tissue plasminogen activator (rtPA). This treatment, despite its promise, continues to exhibit its limitations. Endovascular therapy has several theoretic advantages over IV rtPA, including site specificity, longer treatment windows, and higher recanalization rates. In this article, we will review the various pharmacologic strategies for acute stroke treatment, providing both a historic context and the state of the art. The drugs will be classified on the basis of their theoretic rationale for therapy. Next, we will review the various devices and strategies for mechanical revascularization with an aim toward comprehensiveness. These range from wire disruption of thrombus to preclinical trials for novel mechanical solutions. This first installment of this 2-part series will end with an analysis of retrograde reperfusion techniques.

Am J Neuroradiol 30:859-875, May 2009

R.G. Nogueira,[a,b] A.J. Yoo[a], F.S. Buonanno[b] and J.A. Hirsch[a]

[a] *Endovascular Neurosurgery/Interventional Neuroradiology Section, Massachusetts General Hospital, Harvard Medical School, Boston, Mass*
[b] *Departments of Radiology and Neurosurgery; and Neurocritical Care and Vascular Neurology Section, Department of Neurology, Massachusetts General Hospital, Harvard Medical School, Boston, Mass*

ENDOVASCULAR APPROACHES TO ACUTE STROKE, PART 2: A COMPREHENSIVE REVIEW OF STUDIES AND TRIALS

SUMMARY: Reperfusion remains the mainstay of acute ischemic stroke treatment. Endovascular therapy has become a promising alternative for patients who are ineligible for or have failed intravenous (IV) thrombolysis. The conviction that recanalization of properly selected patients is essential for the achievement of good clinical outcomes has led to the rapid and widespread growth in the adoption of endovascular stroke therapies. However, comparisons of the recent reperfusion studies have brought into question the strength of the association between revascularization and improved clinical outcome. Despite higher rates of recanalization, the mechanical thrombectomy studies have demonstrated substantially lower rates of good outcomes compared with IV and/or intra-arterial thrombolytic trials. However, such analyses disregard important differences in clot location and burden, baseline stroke severity, time from stroke onset to treatment, and patient selection in these studies. Many clinical trials are testing novel devices and drugs as well as the paradigm of physiology-based stroke imaging as a treatment-selection tool. The objective of this article is to provide a comprehensive review of the relevant past, current, and upcoming data on endovascular stroke therapy with a special focus on the prospective studies and randomized clinical trials.

Am J Neuroradiol 30:1206-1212, June-July 2009

P.G. Kranz[a] and J.D. Eastwood[a]

[a] *From the Department of Radiology, Duke University Medical Center, Durham, NC*

DOES DIFFUSION-WEIGHTED IMAGING REPRESENT THE ISCHEMIC CORE? AN EVIDENCE-BASED SYSTEMATIC REVIEW

BACKGROUND AND PURPOSE: Diffusion-weighted imaging (DWI) hyperintensity is hypothesized to represent irreversibly infracted tissue (ischemic core) in the setting of acute stroke. Measurement of the ischemic core has implications for both prognosis and therapy. We wished to assess the level of evidence in the literature supporting this hypothesis. MATERIALS AND METHODS: We performed a systematic review of the literature relating to tissue outcomes of DWI hyperintense stroke lesions in humans. The methodologic rigor of studies was evaluated by using criteria set out by the Oxford Centre for Evidence-Based Medicine. Data from individual studies were also analyzed to determine the prevalence of patients demonstrating lesion progression, no change, or lesion regression compared with follow-up imaging. RESULTS: Limited numbers of highly methodologically rigorous studies (Oxford levels 1 and 2) were available. There was great variability in observed rates of DWI lesion reversal (0%-83%), with a surprisingly high mean rate of DWI lesion reversal (24% of pooled patients). Many studies did not include sufficient data to determine the precise prevalence of DWI lesion growth or reversal. CONCLUSIONS: The available tissue-outcome evidence supporting the hypothesis that DWI is a surrogate marker for ischemic core in humans is troublingly inconsistent and merits an overall grade D based on the criteria set out by the Oxford Centre for Evidence-Based Medicine.

Am J Neuroradiol 30:1213-1221, June-July 2009

J.E. Delgado Almandoz,[a] P.W. Schaefer,[a] N.P. Forero,[a] J.R. Falla,[a] R.G. Gonzalez[a] and J.M. Romero[a]

[a] *From the Division of Neuroradiology, Radiology Department, Massachusetts General Hospital, Boston, Mass*

DIAGNOSTIC ACCURACY AND YIELD OF MULTIDETECTOR CT ANGIOGRAPHY IN THE EVALUATION OF SPONTANEOUS INTRAPARENCHYMAL CEREBRAL HEMORRHAGE

BACKGROUND AND PURPOSE: Multidetector CT angiography (MDCTA) is emerging as the favored initial diagnostic examination in the evaluation of patients presenting with spontaneous intraparenchymal hemorrhage (IPH). This study aims to evaluate the diagnostic accuracy and yield of MDCTA for the detection of vascular etiologies in adult patients presenting to the emergency department with IPH. MATERIALS AND METHODS: We conducted a retrospective study of 623 consecutive adult patients presenting to the emergency department with IPH, who were evaluated with MDCTA during a 9-year period. CT angiograms were reviewed by 2 neuroradiologists to determine the IPH site and the presence of a vascular etiology. Patients with associated subarachnoid hemorrhage in the basal cisterns were excluded from the study. Medical records were reviewed for risk factors and correlation with final diagnosis. The diagnostic accuracy of MDCTA compared with conventional angiography, intraoperative evaluation, and pathologic findings was determined, when available. Multiple-variable logistic regression analysis was performed to determine clinical and radiologic factors that predict a higher yield of MDCTA. RESULTS: MDCTA demonstrated a vascular etiology in 91 patients (14.6%), with a sensitivity of 96%, specificity of 99%, and diagnostic accuracy of 98%. We found independent, statistically significant higher yields of MDCTA in patients with the following characteristics: 1) age younger than 46 years (47%); 2) lobar (20%) or infratentorial (16%) IPH, especially lobar IPH with associated intraventricular hemorrhage (25%); 3) female sex (18%); or 4) neither known hypertension nor impaired coagulation at presentation (33%). CONCLUSIONS: MDCTA is an accurate diagnostic examination in the evaluation of adult patients presenting with spontaneous IPH and should be performed in all patients with the aforementioned clinical and radiologic characteristics.