Role of MRI in unidentified focal neurological deficit

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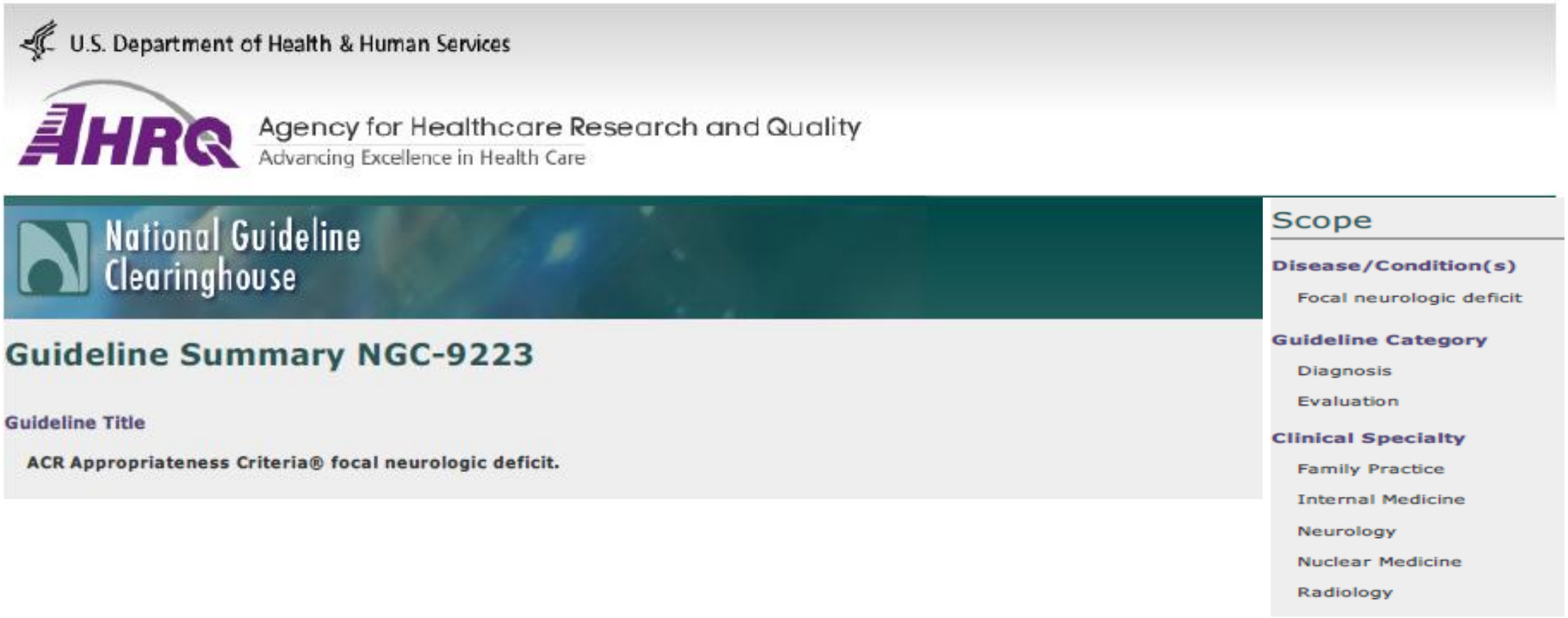
Focal neurological deficit

- impairments of nerve, spinal cord, or brain function that affects a specific region of the body, e.g. weakness in the left arm, the right leg, paresis, or plegia.

MRI

- Availability
- Expensive
- Takes time
- Claustrophobia
- Contraindications: pacemakers, aneurysm clips, ferromagnetic materials etc.
- Aphasia, depression of consciousness, or confusion - reliable history



- https://www.guideline.gov/content.aspx?id=37918

Date of origin: 2006
Last review date: 2012

American College of Radiology
ACR Appropriateness Criteria®

Clinical Condition: **Focal Neurologic Deficit**

Variant 1: **Single focal neurologic deficit, acute onset, stable or incompletely resolving.**

Radiologic Procedure	Rating	Comments	RRL*
MRI head without and with contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses. See statement regarding contrast in text under "Anticipated Exceptions."	O
CT head without contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses.	☢☢☢
MRI head without contrast	7		O
MRA head and neck without and with contrast	7	See statement regarding contrast in text under "Anticipated Exceptions."	O
MRA head and neck without contrast	7		O
CTA head and neck with contrast	7		☢☢☢
CT head perfusion with contrast	7		☢☢☢
MRI head perfusion with contrast	7	See statement regarding contrast in text under "Anticipated Exceptions."	O
CT head without and with contrast	5	If MRI is unavailable or contraindicated. Consider CT perfusion.	☢☢☢
CT head with contrast	4		☢☢☢
MR spectroscopy head without contrast	4		O
MRI functional (fMRI) head without contrast	3		O
Tc-99m HMPAO SPECT head	3	For problem solving in HIV/AIDS.	☢☢☢☢
Arteriography cervicocerebral	3	For problem solving.	☢☢☢
FDG-PET/CT head	2		☢☢☢☢
Thallium-201 SPECT head	2	For problem solving in HIV/AIDS.	☢☢☢☢

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level

- Wippold FJ, Cornelius RS, Aiken AH, Amin-Hanjani S, Berger KL, Broderick DF, Davis PC, Douglas AC, Hoh BL, Mechtler LL, Smirniotopoulos JG, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria® focal neurologic deficit. [online publication]. Reston (VA): American College of Radiology (ACR); 2012. 11 p.

Clinical Condition: Focal Neurologic Deficit

Variant 1: Single focal neurologic deficit, acute onset, stable or incompletely resolving.

Radiologic Procedure	Rating	Comments	RRL*
MRI head without and with contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses. See statement regarding contrast in text under "Anticipated Exceptions."	O
CT head without contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses.	☢☢☢
MRI head without contrast	7		O

- Wippold FJ, Cornelius RS, Aiken AH, Amin-Hanjani S, Berger KL, Broderick DF, Davis PC, Douglas AC, Hoh BL, Mechtler LL, Smirniotopoulos JG, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria® focal neurologic deficit. [online publication]. Reston (VA): American College of Radiology (ACR); 2012. 11 p.

Clinical Condition: Focal Neurologic Deficit

Variant 2: Single focal neurologic deficit, acute onset, completely resolving.

Radiologic Procedure	Rating	Comments	RRL*
MRI head without and with contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses. See statement regarding contrast in text under "Anticipated Exceptions."	O
CT head without contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses.	☢ ☢ ☢
MRI head without contrast	7	See statement regarding contrast in text under "Anticipated Exceptions."	O
MRA head and neck without and with contrast	7		O
MRA head and neck without contrast	7		O

- Wippold FJ, Cornelius RS, Aiken AH, Amin-Hanjani S, Berger KL, Broderick DF, Davis PC, Douglas AC, Hoh BL, Mechtler LL, Smirniotopoulos JG, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria® focal neurologic deficit. [online publication]. Reston (VA): American College of Radiology (ACR); 2012. 11 p.

Clinical Condition: Focal Neurologic Deficit

Variant 3: Single focal neurologic deficit, acute onset, progressive.

Radiologic Procedure	Rating	Comments	RRL*
MRI head without and with contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses. See statement regarding contrast in text under "Anticipated Exceptions."	O
MRI head without contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses.	O
CT head without contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses.	☢☢☢

- Wippold FJ, Cornelius RS, Aiken AH, Amin-Hanjani S, Berger KL, Broderick DF, Davis PC, Douglas AC, Hoh BL, Mechtler LL, Smirniotopoulos JG, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria® focal neurologic deficit. [online publication]. Reston (VA): American College of Radiology (ACR); 2012. 11 p.

Clinical Condition: Focal Neurologic Deficit

Variant 4: Single or multiple focal neurologic deficits, subacute onset, progressive or fluctuating.

Radiologic Procedure	Rating	Comments	RRL*
MRI head without and with contrast	8	See statement regarding contrast in text under "Anticipated Exceptions."	O
MRI head without contrast	8		O
CT head without contrast	7	Acute screening.	☢☢☢
MRA head and neck without and with contrast	6	See statement regarding contrast in text under "Anticipated Exceptions."	O

- Wippold FJ, Cornelius RS, Aiken AH, Amin-Hanjani S, Berger KL, Broderick DF, Davis PC, Douglas AC, Hoh BL, Mechtler LL, Smirniotopoulos JG, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria® focal neurologic deficit. [online publication]. Reston (VA): American College of Radiology (ACR); 2012. 11 p.

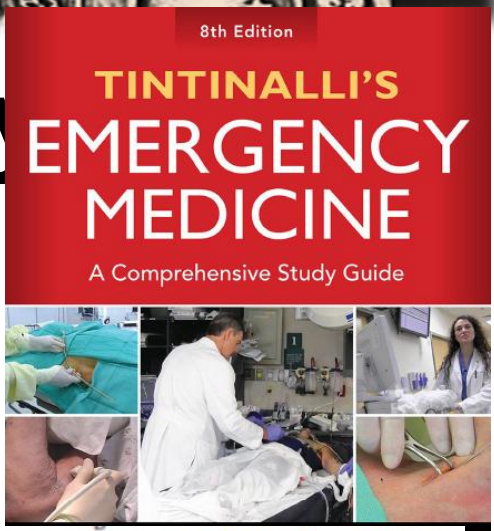
Clinical Condition: Focal Neurologic Deficit

Variant 5: Unexplained acute confusion or altered level of consciousness.

Radiologic Procedure	Rating	Comments	RRL*
MRI head without and with contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses. See statement regarding contrast in text under "Anticipated Exceptions."	O
MRI head without contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses.	O
CT head without contrast	8	Both CT and MRI may be necessary. CT screens for suspected hemorrhage in the acute setting and MRI screens for infarction and masses.	☢☢☢

- Wippold FJ, Cornelius RS, Aiken AH, Amin-Hanjani S, Berger KL, Broderick DF, Davis PC, Douglas AC, Hoh BL, Mechtler LL, Smirniotopoulos JG, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria® focal neurologic deficit. [online publication]. Reston (VA): American College of Radiology (ACR); 2012. 11 p.

What Does The Holy Textbook Say



- **For Stroke:** DWI is superior to non-contrast CT or other types of MRI (T1/T2 weighted, Fluid-attenaeted inversion recovery) in the detection of acute infarction.
- **For First Seizure:** CT and suggest further imaging studies with the consulting neurologist.
- No MRI recommendation in **CNS/Spinal Infections**

Diffusion-weighted MRI is superior to non–contrast-enhanced CT or other types of MRI (T1/T2 weighted, fluid-attenuated inversion recovery) in the detection of acute infarction.[63,64] However, at this time, the ED role of MRI for acute stroke is limited because of MRI's uncertain accuracy in detecting acute hemorrhage,[65] lack of rapid availability,[66] patient-specific contraindications (lack of cooperation, claustrophobia, metallic implants or pacemakers, and diminished access to the patient), relative inexperience in some practitioners in interpreting MRI scans in acute stroke, and cost-effectiveness. In addition, thrombolytic inclusion/exclusion criteria were originally developed using CT findings,[67] although the use of MRI-based rtPA selection criteria continues to be explored.[68,69] Postthrombolysis diffusion-weighted MRI may be useful in differentiating stroke from other diagnoses such as TIA and stroke mimics (including coronary artery disease) in patients who have received rtPA.[70]

Despite these caveats, the current AHA/ASA acute ischemic stroke guidelines recommend either non–contrast-enhanced CT or MRI as the initial imaging in the acute stroke patient.[7] However, **in the vast majority of EDs, a non–contrast-enhanced CT is the most readily available imaging study and is the *only* imaging study necessary prior to administration of rtPA.**[71]

Diffusion Weighted MRI

- Brownian motion of water molecules
- Hyperacute phase/cytotoxic edema
- **DWI imaging has a major role in the following clinical situations:**

  early identification of ischemic stroke
  differentiation of acute from chronic stroke
  differentiation of acute stroke from other stroke mimics
  differentiation of epidermoid cyst from arachnoid cyst
  differentiation of abscess from necrotic tumors
  assessment of cortical lesions in CJD
  differentiation of herpes encephalitis from diffuse temporal gliomas
  assessment of the extent of diffuse axonal injury
  grading of gliomas and meningiomas (need further study)
  assessment of active demyelination

Up-to-date Literature

Ann Emerg Med. 2013 Jan;61(1):62-71.e1. doi: 10.1016/j.annemergmed.2012.01.013. Epub 2012 Mar 3.

Does diffusion-weighted imaging predict short-term risk of stroke in emergency department patients with transient ischemic attack?

Oostema JA[1], Brown MD, DeLano M, Falzon L, Reeves MJ.

⊕ Author information

Abstract

STUDY OBJECTIVE: The optimal diagnostic evaluation for establishing the risk of stroke among patients presenting to the emergency department (ED) with a transient ischemic attack has not been determined. The objective of this review is to assess the ability of diffusion-weighted magnetic resonance imaging (MRI) to predict the short-term risk of stroke.

METHODS: MEDLINE, EMBASE, and the Cochrane Library were queried to identify studies examining the use of diffusion-weighted MRI in patients with classically defined transient ischemic attack. The primary outcome measure was the rate of stroke at 48 hours. Two reviewers determined study eligibility and extracted data. Quality was assessed according to published recommendations for the design and reporting of prognostic studies.

RESULTS: One thousand six hundred ninety-six abstracts were identified and 35 articles underwent full-text review. Six cohort studies met the inclusion criteria but were limited by selection bias and differences in duration and completeness of follow-up. Results were not consistent across studies, with 5 reporting higher rates of stroke among diffusion-weighted MRI-positive patients, whereas 1 study reported higher rates in diffusion-weighted MRI-negative patients. Among the 4 studies (N=629 patients) reporting 48-hour outcomes, the risk of stroke ranged from 0% to 2.9% in patients with negative diffusion-weighted MRI findings compared with 0% to 9% among those with positive diffusion-weighted MRI results.

CONCLUSION: Studies of variable quality, consistency, and precision suggest that diffusion-weighted MRI may identify patients at sufficiently low risk to warrant ED discharge and close outpatient follow-up.

Stroke. 2013 Apr;44(4):1169-71. doi: 10.1161/STROKEAHA.111.000527. Epub 2013 Feb 28.

Accuracy of diffusion-weighted imaging in the diagnosis of stroke in patients with suspected cerebral infarct.

Brunser AM[1], Hoppe A, Illanes S, Díaz V, Muñoz P, Cárcamo D, Olavarria V, Valenzuela M, Lavados P.

Author information

Abstract

BACKGROUND AND PURPOSE: The accuracy of diffusion-weighted imaging (DWI) for the diagnosis of acute cerebral ischemia among patients with suspected ischemic stroke arriving to an emergency room has not been studied in depth.

METHODS: DWI was performed in 712 patients with acute or subacute focal symptoms that suggested an acute ischemic stroke (AIS), 609 of them with AIS.

RESULTS: DWI demonstrated a sensitivity of 90% and specificity of 97%, a positive likelihood ratio of 31 and a negative likelihood ratio of 0.1 for detecting AIS. The overall accuracy was 95%. Of those patients who demonstrated abnormal DWI studies, 99.5% were AIS patients, and of those patients with normal DWI studies 63% were stroke mimics.

CONCLUSIONS: DWI is accurate in detecting AIS in unselected patients with suspected AIS; a negative study should alert for nonischemic conditions.

Neurohospitalist. 2014 Apr;4(2):66-73. doi: 10.1177/1941874413519804.

Incorporating diffusion-weighted magnetic resonance imaging into an observation unit transient ischemic attack pathway: a prospective study.

Oostema JA[1], Delano M[2], Bhatt A[3], Brown MD[1].

Author information

Abstract

BACKGROUND AND PURPOSE: National guidelines advocate for early, aggressive transient ischemic attack (TIA) evaluations and recommend diffusion-weighted magnetic resonance imaging (MRI) for brain imaging. The purpose of this study is to examine clinician compliance, the yield of MRI, and patient-centered clinical outcomes following implementation of an emergency department observation unit (EDOU) clinical pathway incorporating routine MRI into the acute evaluation of patients with TIA.

METHODS: This is a prospective observational study of patients with TIA admitted from the ED. Patients with low-risk TIA were transferred to an EDOU for diagnostic testing including MRI; high-risk patients were directed to hospital admission. Clinical variables, diagnostic tests, and treatment were recorded for all patients. The primary clinical outcome was the rate of stroke or recurrent TIA, determined through telephone follow-up and medical record review at 7 and 30 days.

RESULTS: A total of 116 patients with TIA were enrolled. In all, 92 (79.3%) patients were transferred to the EDOU, of whom 69 (59.5%) were discharged without hospitalization. Compliance with the EDOU pathway was 83 (91.2%) of 92. Magnetic resonance imaging demonstrated acute infarct in 16 (15.7%) of 102 patients. Stroke (n = 2) or TIA (n = 3) occurred in 5 patients with TIA (4.3%, 95% confidence interval: 1.6%-10.0%) within 30 days; no strokes occurred after discharge.

CONCLUSIONS: Implementation of a TIA clinical pathway incorporating MRI effectively encouraged guideline-compliant diagnostic testing; however, patient-important outcomes appear similar to diagnostic protocols without routine MRI. Further study is needed to assess the benefits and costs associated with routinely incorporating MRI into TIA evaluation.

BMC Neurol. 2014 Apr 10;14:80. doi: 10.1186/1471-2377-14-80.

Focal subarachnoid haemorrhage mimicking transient ischaemic attack--do we really need MRI in the acute stage?

Ertl L[1], Morhard D, Deckert-Schmitz M, Linn J, Schulte-Altedorneburg G.

Author information

Abstract

BACKGROUND: Acute non-traumatic focal subarachnoid haemorrhage (fSAH) is a rare transient ischaemic attack (TIA)-mimic. MRI is considered to be indispensable by some authors in order to avoid misdiagnosis, and subsequent improper therapy. We therefore evaluated the role of CT and MRI in the diagnosis of fSAH patients by comparing our cases to those from the literature.

METHODS: From 01/2010 to 12/2012 we retrospectively identified seven patients with transient neurological episodes due to fSAH, who had received unenhanced thin-sliced multiplanar CT and subsequent MRI within 3 days on a 1.5 T scanner. MRI protocol included at least fast-field-echo (FFE), diffusion-weighted imaging (DWI), T2-weighted fluid-attenuated inversion recovery (FLAIR) and time-of-flight (TOF) MRA sequences. By using MRI as gold-standard, we re-evaluated images and data from recent publications regarding the sensitivity to detect fSAH in unenhanced CT.

RESULTS: fSAH was detected by CT and by FFE and FLAIR on MRI in all of our own cases. However, DWI and T2w-spin-echo sequences revealed fSAH in 3 of 7 and 4 of 6 cases respectively. Vascular imaging was negative in all cases. FFE-MRI revealed additional multiple microbleeds and superficial siderosis in 4 of 7 patients and 5 of 7 patients respectively. Including data from recently published literature CT scans delivered positive results for fSAH in 95 of 100 cases (95%), whereas MRI was positive for fSAH in 69 of 69 cases (100%).

CONCLUSIONS: Thin-sliced unenhanced CT is a valuable emergency diagnostic tool to rule out intracranial haemorrhage including fSAH in patients with acute transient neurological episodes if immediate MRI is not available. However, MRI work-up is crucial and mandatorily has to be completed within the next 24-72 hours.

Int J Stroke. 2015 Apr;10(3):343-7. doi: 10.1111/ijs.12390. Epub 2014 Nov 3.

TIA triage in emergency department using acute MRI (TIA-TEAM): a feasibility and safety study.

Vora N[1], Tung CE, Mlynash M, Garcia M, Kemp S, Kleinman J, Zaharchuk G, Albers G, Olivot JM.

Author information

[1]Department of Neurology and Neurological Sciences, Stanford School of Medicine, Stanford, CA, USA.

Abstract

BACKGROUND: Positive diffusion weighted imaging (DWI) on MRI is associated with increased recurrent stroke risk in TIA patients. Acute MRI aids in TIA risk stratification and diagnosis.

AIM: To evaluate the feasibility and safety of TIA triage directly from the emergency department (ED) with acute MRI and neurological consultation.

METHODS: Consecutive ED TIA patients assessed by a neurologist underwent acute MRI/MRA of head/neck per protocol and were hospitalized if positive DWI, symptomatic vessel stenosis, or per clinical judgment. Stroke neurologist adjudicated the final TIA diagnosis as definite, possible, or not a cerebrovascular event. Stroke recurrence rates were calculated at 7, 90, 365 days and compared with predicted stroke rates derived from historical DWI and ABCD(2) score data.

RESULTS: One hundred twenty-nine enrolled patients had a mean age of 69 years (± 17) and median ABCD(2) score of 3 (interquartile range [IQR] 3-4). During triage, 112 (87%) patients underwent acute MRI after a median of 16 h (IQR 10-23) from symptom onset. No patients experienced a recurrent event before imaging. Twenty-four (21%) had positive DWI and 8 (7%) had symptomatic vessel stenosis. Of the total cohort, 83 (64%) were discharged and 46 (36%) were hospitalized. By one-year follow-up, one patient in each group had experienced a stroke. Of 92 patients with MRI and index cerebrovascular event, recurrent stroke rates were 1.1% at 7 and 90 days. These were similar to predicted recurrence rates.

CONCLUSION: TIA triage in the ED using a protocol with neurological consultation and acute MRI is feasible and safe. The majority of patients were discharged without hospitalization and rates of recurrent stroke were not higher than predicted.

J Stroke Cerebrovasc Dis. 2015 Sep;24(9):2110-6. doi: 10.1016/j.jstrokecerebrovasdis.2015.05.016. Epub 2015 Jun 30.

Transient Ischemic Attack Fast-track and Long-Term Stroke Risk: Role of Diffusion-Weighted Magnetic Resonance Imaging.

Anticoli S[1], Pezzella FR[1], Pozzessere C[1], Gallelli L[2], Bravi MC[3], Caso V[4], Siniscalchi A[5].

Author information

Abstract

BACKGROUND: Acute ischemic lesions on diffusion-weighted magnetic resonance imaging (DWI-MRI) are reliable predictors of recurrent stroke at 90 days. However, to date, limited information on transient ischemic attack (TIA) patients with positive DWI lesions for stroke risk from 1 to 5 years is available. In this study, we evaluated the role of positive DWI lesions and vascular risk factors on stroke, cardiovascular death, and mortality at 90 days (T0), 1 year (T1), and 5 years (T2). Moreover, we also evaluated the association between stroke risk and the presence of DWI lesions.

METHODS: We performed an observational study on consecutive patients admitted to the emergency department of San Camillo-Forlanini Hospital, Rome, Italy, from January 2007 to November 2012. Over the study period, 4300 patients with TIA or ischemic stroke were examined by stroke specialists in an emergency room setting within 1 hour from admittance.

RESULTS: In 510 of 4300 patients (11.86%), a TIA was diagnosed, and 445 patients satisfy the study inclusion criteria. For all 445 patients, the mean ABCD2 score was 4.35 ± 1.30. Using DWI-MRI, we identified acute ischemic lesions in 185 patients (41.57%). We did not observe any correlation between duration of symptoms, ABCD2 score, and positive or negative DWI lesions. Positivity for DWI was not associated with the presence of diabetes mellitus, hypertension, smoking habit, or age; however, an association with weakness was observed. We documented a time-dependent increase in the absolute risk of stroke: T0: 1.35% (95% confidence interval [CI], .81-2.8); T1: 4.78% (95% CI, 2.88-7.47); T2: 9.02% (95% CI, 4.66-5.70). We did not record any difference in stroke risk in patients with positive DWI lesions: T0: hazard ratio [HR], 1.43; 95% CI, .35-5.88; log-rank P = .60; T1: HR, 1.04; 95%CI, .42-2.61; log-rank P = .91; T2: HR, .83; 95% CI, .25-2.67; log-rank P = .86.

CONCLUSIONS: This long-term follow-up study in TIA patients documents that both positive and negative DWI patients treated with fast-track had similar long-term risks of stroke.

JAMA Neurol. 2016 May 1;73(5):572-8. doi: 10.1001/jamaneurol.2015.4906.

Imaging Parameters and Recurrent Cerebrovascular Events in Patients With Minor Stroke or Transient Ischemic Attack.

Yaghi S[1], Rostanski SK[2], Boehme AK[2], Martin-Schild S[3], Samai A[3], Silver B[1], Blum CA[1], Jayaraman MV[4], Siket MS[5], Khan M[1], Furie KL[1], Elkind MS[6], Marshall RS[2], Willey JZ[2].

Author information

Abstract

IMPORTANCE: Neurological worsening and recurrent stroke contribute substantially to morbidity associated with transient ischemic attacks and strokes (TIA-S).

OBJECTIVE: To determine predictors of early recurrent cerebrovascular events (RCVEs) among patients with TIA-S and National Institutes of Health Stroke Scale scores of 0 to 3.

DESIGN, SETTING, AND PARTICIPANTS: A retrospective cohort study was conducted at 2 tertiary care centers (Columbia University Medical Center, New York, New York, and Tulane University Medical Center, New Orleans, Louisiana) between January 1, 2010, and December 31, 2014. All patients with neurologist-diagnosed TIA-S with a National Institutes of Health Stroke Scale score of 0 to 3 who presented to the emergency department were included.

MAIN OUTCOMES AND MEASURES: The primary outcome (adjudicated by 3 vascular neurologists) was RCVE: neurological deterioration in the absence of a medical explanation or recurrent TIA-S during hospitalization.

RESULTS: Of the 1258 total patients, 1187 had no RCVEs and 71 had RCVEs; of this group, 750 patients (63.2%) and 39 patients (54.9%), respectively, were aged 60 years or older. There were 505 patients with TIA-S at Columbia University; 31 (6.1%) had RCVEs (15 patients had neurological deterioration only, 11 had recurrent TIA-S only, and 5 had both). The validation cohort at Tulane University consisted of 753 patients; 40 (5.3%) had RCVEs (24 patients had neurological deterioration only and 16 had both). Predictors of RCVE in multivariate models in both cohorts were infarct on neuroimaging (computed tomographic scan or diffusion-weighted imaging sequences on magnetic resonance imaging) (Columbia University: not applicable and Tulane University: odds ratio, 1.75; 95% CI, 0.82-3.74; P = .15) and large-vessel disease etiology (Columbia University: odds ratio, 6.69; 95% CI, 3.10-14.50 and Tulane University: odds ratio, 8.13; 95% CI, 3.86-17.12; P < .001). There was an increase in the percentage of patients with RCVEs when both predictors were present. When neither predictor was present, the rate of RCVE was extremely low (up to 2%). Patients with RCVEs were less likely to be discharged home in both cohorts.

CONCLUSIONS AND RELEVANCE: In patients with minor stroke, vessel imaging and perhaps neuroimaging parameters, but not clinical scores, were associated with RCVEs in 2 independent data sets. Prospective studies are needed to validate these predictors.

Seizure. 2016 Apr 23;38:63-67. doi: 10.1016/j.seizure.2016.04.007. [Epub ahead of print]

Brain magnetic resonance in status epilepticus: A focused review.

Mendes A[1], Sampaio L[2].

Author information

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[2]Neuroradiology Department of Centro Hospitalar de São João, Alameda Hernâni Monteiro, 4200 Porto, Portugal. Electronic address: lfvsampaio@sapo.pt.

Abstract

PURPOSE: Status epilepticus (SE) is a neurological emergency with multiple etiologies and a complex pathophysiology, which is incompletely understood. Brain magnetic resonance imaging (MRI) represents a noninvasive tool to increase our knowledge about epileptogenesis. This paper aims to review the main MRI findings in SE.

METHOD: We conducted a search in Medline database using the terms "MRI", "brain" and "status epilepticus" and further crossed for "diffusion-weighted image" (DWI), "perfusion", "spectroscopy", "susceptibility-weighted image" (SWI), "mortality", "morbidity" and "outcome". Inclusion: original articles written in English and selected case reports published from 1995 to 2015. Exclusion: reviews.

RESULTS: MRI may play a pivotal role in the disclosure of the etiology of SE, epileptic focus location and seizure propagation. Several techniques have been used. Concerning DWI, experimental models and clinical studies have complementary results. Periictal abnormalities may occur with cytotoxic and/or vasogenic edema involving both cortical and subcortical structures, but literature is controversial regarding their significance. DWI changes can be transient, but their maintenance could mean irreversible neuronal damage leading to focal brain atrophy and gliosis (mostly in the hippocampal region), possibly developing a new epileptic focus. Perfusion studies, including arterial spin labeling data, showed changes in cerebral blood flow. We also explore the possible vascular insight provided by SWI.

CONCLUSION: Ongoing imaging technical advances, particularly regarding MRI, may shed a light on SE pathophysiology and its structural or functional consequences, in a noninvasive way. Its findings may have implications in prognosis, potentially allowing the development of new and more individualized therapeutic.

Conclusion

- Focal neurologic deficits typically localize to an anatomic site within the CNS and often point to a specific etiology such as ischemic cerebrovascular disease, hemorrhage, tumor, or abscess.
- Neurological examination
- Have time/Not overcrowded/Availability 7/24

- Diffusion weighted MRI for hyperacute phases

Any Questions?

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