ACR Appropriateness Criteria Headache

Annette C. Douglas, MD[a], Franz J. Wippold II, MD[b], Daniel F. Broderick, MD[c], Ashley H. Aiken, MD[d], Sepideh Amin-Hanjani, MD[e,f], Douglas C. Brown, MD[g], Amanda S. Corey, MD[h], Isabelle M. Germano, MD[i,j], James A. Hadley, MD[k,l], Bharathi D. Jagadeesan, MD[m], Jennifer S. Jurgens, MD[n], Tabassum A. Kennedy, MD[o], Laszlo L. Mechtler, MD[p,q], Nandini D. Patel, MD[r], Gregory J. Zipfel, MD[s]

Most patients presenting with uncomplicated, nontraumatic, primary headache do not require imaging. When history, physical, or neurologic examination elicits "red flags" or critical features of the headache, then further investigation with imaging may be warranted to exclude a secondary cause. Imaging procedures may be diagnostically useful for patients with headaches that are: associated with trauma; new, worse, or abrupt onset; thunderclap; radiating to the neck; due to trigeminal autonomic cephalgia; persistent and positional; and temporal in older individuals. Pregnant patients, immunocompromised individuals, cancer patients, and patients with papilledema or systemic illnesses, including hypercoagulable disorders may benefit from imaging. Unlike most headaches, those associated with cough, exertion, or sexual activity usually require neuroimaging with MRI of the brain with and without contrast to exclude potentially underlying pathology before a primary headache syndrome is diagnosed.

The ACR Appropriateness Criteria are evidence-based guidelines for specific clinical conditions that are reviewed every 2 years by a multidisciplinary expert panel. The guideline development and review include an extensive analysis of current medical literature from peer-reviewed journals and the application of a well-established consensus methodology (modified Delphi) to rate the appropriateness of imaging and treatment procedures by the panel. In those instances in which evidence is lacking or not definitive, expert opinion may be used to recommend imaging or treatment.

Key Words: Appropriateness criteria, headache, hemorrhage, thunderclap, mass

J Am Coll Radiol 2014;■:■-■.

SUMMARY OF LITERATURE REVIEW

Introduction/Background

The cause or type of most headaches can be determined by taking a careful history and performing a physical examination. Warning signals and "red flags" may prompt further diagnostic testing. In the absence of worrisome features in the history or examination, the task is then to diagnose the primary headache syndrome

[a]Indiana University Hospital, Indianapolis, Indiana.

[b]Mallinckrodt Institute of Radiology, Saint Louis, Missouri.

[c]Mayo Clinic Jacksonville, Jacksonville, Florida.

[d]Emory Healthcare, Atlanta, Georgia.

[e]University of Illinois College of Medicine, Chicago, Illinois.

[f]American Association of Neurological Surgeons, Rolling Meadows, Illinois/Congress of Neurological Surgeons, Schaumburg, Illinois.

[g]Hampton Roads Radiology Associates, Norfolk, Virginia.

[h]Emory University, Atlanta, Georgia.

[i]Mount Sinai School of Medicine, New York, New York.

[j]American Association of Neurological Surgeons, Rolling Meadows, Illinois/Congress of Neurological Surgeons, Schaumburg, Illinois.

[k]Physicians Regional Medical Center, Naples, Florida.

[l]American Academy of Otolaryngology-Head and Neck Surgery, Alexandria, Virginia.

[m]University of Minnesota, Minneapolis, Minnesota.

[n]Walter Reed National Military Medical Center, Bethesda, Maryland, Society of Nuclear Medicine and Molecular Imaging, Reston, Virginia.

[o]University of Wisconsin Hospital and Clinic, Madison, Wisconsin.

[p]Dent Neurologic Institute, Amherst, New York.

[q]American Academy of Neurology, Minneapolis, Minnesota.

[r]Fairfax Radiology Consultants PC, Fairfax, Virginia.

[s]Washington University School of Medicine, St. Louis, Missouri, American Association of Neurological Surgeons, Rolling Meadows, Illinois/Congress of Neurological Surgeons, Schaumburg, Illinois.

Corresponding Author: Franz J. Wippold II, MD. Attn:Neuroradiology Section, 510 S Kingshighway Blvd, Saint Louis, MO 63110-1076; e-mail: wippoldf@mir.wustl.edu.

Reprint requests to: publications@acr.org.

The ACR seeks and encourages collaboration with other organizations on the development of the ACR Appropriateness Criteria through society representation on expert panels. Participation by representatives from collaborating societies on the expert panel does not necessarily imply individual or society endorsement of the final document. No conflicts of interest were reported.

1546-1440/14/$36.00 • http://dx.doi.org/10.1016/j.jacr.2014.03.024

Variant 1. Chronic headache. No new features. Normal neurologic examination

Radiologic Procedure	Rating	Comments
MRI head without and with contrast	4	See statement regarding contrast in text under "Anticipated Exceptions."
MRI head without contrast	4	
CT head without contrast	3	
CT head without and with contrast	3	
CT head with contrast	3	
MRA head without and with contrast	2	
MRA head without contrast	2	
Arteriography cervicocerebral	2	
CTA head with contrast	2	

Note: Rating scale: 1, 2, and 3 = usually not appropriate; 4, 5, and 6 = may be appropriate; 7, 8, and 9 = usually appropriate. CTA = CT angiography; MRA = MR angiography.

based on the clinical features. If atypical features are present or the patient does not respond to conventional therapy, then the possibility of a secondary headache disorder should be investigated and imaging may be appropriate [1].

Several studies have confirmed the low yield of imaging procedures for individuals presenting with isolated headache, ie, headache unaccompanied by other neurologic findings [2-8]. Therefore, when considering a common disorder, such as headache, indications for imaging become relevant.

Chronic Headache, No New Features, and Normal Neurologic Examination

Chronic daily headache represents a range of disorders characterized by the occurrence of long-duration headaches occurring on 15 or more days per month. The classification of these disorders continues to undergo revision to be more clinically relevant [9]. In adult and pediatric patients with migraine, but without recent change in attack pattern, history of seizures, or other focal neurologic symptoms or signs, the routine use of neuroimaging is usually unwarranted [10]. The yield of CT or MRI in patients with headache but normal neurologic examination is quite low [11-24](Variant 1).

Chronic Headache with New Feature or Neurologic Deficit

Although the frequency of structural pathology associated with headache is low [4], new headache features and/or focal neurologic symptoms or signs should alert the clinician to possible serious conditions such as tumors, vascular malformations, or aneurysms [25-33] (Variant 2). Because tumors are rare, and approximately half of them present with headache, it becomes apparent that if all patients with headache undergo imaging procedures, a large proportion of the studies will be negative [4,31]. In patients with underlying neoplasm or suspected brain tumor, MRI with and without contrast is the study of choice. If there are contraindications to MRI, contrast-enhanced CT is a reasonable alternative. In children, if MRI of the brain is positive for brain tumors, particularly in the posterior fossa, contrast-enhanced MRI of the entire spine is essential to exclude drop metastasis. If there is a suspicion for subarachnoid hemorrhage (SAH), then gradient echo (GRE), susceptibility-weighted imaging (SWI), and fluid-attenuated inversion recovery (FLAIR) sequences should be included. Alternatively, noncontrast CT imaging may be indicated to exclude acute intracranial hemorrhage.

In nonacute situations, magnetic resonance angiography (MRA) of the brain without contrast is the most commonly performed technique to assess intracranial arteries. Whether or not MRA without or with contrast is more sensitive and accurate for the assessment of intracranial arterial stenosis or occlusion remains controversial [34,35].

Sudden Onset of Severe Headache—"Thunderclap" Headache

A patient presenting with a sudden, severe headache ("the worst headache of my life" or "thunderclap headache"), particularly if it is not a migraine or if the pattern of the headache is clearly different from the patient's usual headaches, is at a significantly higher risk of an acute SAH (Variant 3). Aneurysms more commonly cause these headaches than arteriovenous

Variant 2. Chronic headache with new feature or neurologic deficit

Radiologic Procedure	Rating	Comments
MRI head without and with contrast	8	See statement regarding contrast in text under "Anticipated Exceptions."
MRI head without contrast	7	
CT head without contrast	7	
CT head without and with contrast	5	
MRA head without and with contrast	4	See statement regarding contrast in text under "Anticipated Exceptions."
MRA head without contrast	4	Perform this procedure in selected cases when vascular disease is suspected.
CTA head with contrast	4	
CT head with contrast	3	
Arteriography cervicocerebral	2	This procedure is not used as a primary diagnostic tool.

Note: Rating scale: 1, 2, and 3 = usually not appropriate; 4, 5, and 6 = may be appropriate; 7, 8, and 9 = usually appropriate. CTA = CT angiography; MRA = MR angiography.