HEALTHHELP®
A WNS COMPANY

2025 Computed Tomography Angiography (CTA) Brain

Diagnostic Imaging

CTA-Brain-HH

Last Review Date: 08/20/2025
Previous Review Date: 05/16/2025
Guideline Initiated: 06/30/2019

HEALTHHELP®

A WNS COMPANY

Table of Contents

Pediatric Considerations for Computed Tomography

While computed tomography (CT) is used in children, magnetic resonance imaging (MRI) or ultrasound is preferred for initial evaluation to minimize radiation exposure. CT is reserved for complex cases where detailed imaging is required. By integrating ultrasound and adhering to these guidelines, healthcare providers can optimize diagnostic accuracy while minimizing risks associated with radiation.
Recommendations for CT imaging include **ALL** of the following:

1. Ultrasound first: Utilize ultrasound as the initial modality where appropriate.
2. CT for complex cases: Reserve CT for when ultrasound or MRI is inadequate.
3. Adhere to guidelines: Follow established protocols to ensure safety and efficacy.
4. Minimize radiation exposure: Especially important for children, young adults and pregnant women.

Computed Tomography Angiography (CTA) Brain/Head

CTA Brain Related National Coverage Determination (NCD)/ Local Coverage Determination (LCD)

Please refer to https://www.cms.gov/medicare-coverage-database/search.aspx if applicable to the individual's health plan membership.

Type/ID Number	Title
NCD 220.1	Computed Tomography

Clinical Judgment

These medical policies are designed to provide clinical guidance and do not supplant a provider's independent professional judgment. Physicians retain full and independent authority to determine appropriate care based on each patient's individual clinical circumstances. Although services may be subject to documentation requirements, medical necessity review, or coverage limitations, nothing in this policy is intended to restrict or interfere with a physician's independent medical judgment.

CTA General Contraindications

Computed tomography angiography (CTA) is contraindicated for **ANY** of the following:

- Clinical instability (eg, respiratory distress, severe hypotension, unstable arrhythmias)

References: [1] [2]

- Contrast allergy
  References: [1] [2]
- Renal impairment (glomerular filtration rate [GFR] is less than 30 ml/min/1.73 m^2.)
  References: [1] [2]
- **CANNOT** follow procedure directions (eg, holding breath, **NOT** moving)
  References: [1] [2]

Preamble: Pediatric Diagnostic Imaging

HealthHelp's clinical guidelines for the Diagnostic Imaging program, are intended to apply to both adults and pediatrics (21 years of age or younger), unless otherwise specified within the criteria.

CTA Brain/Head Guideline

Computed tomography angiography (CTA) of the brain/head is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Intracranial vascular disease is suspected for **ANY** of the following:
   a. Aneurysm screening and **ANY** of the following:
      i. Aortic diseases are known (aneurysm, coarctation, dissection).
      ii. Bicuspid aortic valve
      iii. Ehlers-Danlos, vascular syndrome; at diagnosis and every 18 months thereafter
      iv. Fibromuscular dysplasia (FMD); one time vascular study from brain to pelvis
      v. First-degree relatives (child, parent, sibling) with a history of intracranial aneurysm and **EITHER** of the following: (*__NOTE__: *repeat screening is recommended every 5 years.*)
         A. Asymptomatic, at least **TWO** first-degree relatives with histories of an intracranial aneurysm.
         B. Symptomatic (eg, headache, nausea, vomiting), at least **ONE** first-degree relative with a history of intracranial aneurysm.
      vi. Loeys-Dietz syndrome, at diagnosis and every 2 years thereafter (more frequently if abnormalities are found)
      vii. Spontaneous coronary arteries dissection (SCAD); one time vascular study from brain to pelvis

viii. Takayasu's arteritis

b. Benign intracranial hypertension (pseudotumor cerebri) determination from dural sinus thrombosis and magnetic resonance venography (MRV) is **contraindicated or unavailable**.

c. Cerebral intraparenchymal hemorrhage is known, based on prior imaging, and underlying vascular abnormality (eg, arteriovenous malformation, dural venous fistula, venous varices) is suspected.

d. Cerebral vasospasm (eg, severe headaches, speech difficulties, weakness or paralysis on one side of the body) is suspected or known.

e. Horner's syndrome (anhidrosis, miosis, ptosis)

f. Moyamoya disease (eg, cognitive decline, recurrent headaches, seizures) is suspected.

g. Reversible cerebral vasoconstriction syndrome (RCVS) (eg, demonstrated on prior imaging, recurrent thunder clap headache ["worst headache of my life]) is suspected.

h. Sickle cell disease (hemorrhagic or ischemic), magnetic resonance angiography (MRA) is **contraindicated or unavailable** and **ANY** of the following:

i. Neurological signs (eg, dizziness, numbness, pain)

ii. Transcranial doppler velocity is more than 200 cm/second (increased stroke risk) and age is 2 years to 16 years.

i. Stroke, ischemic, or transient ischemic attack (TIA) occurred within last 6 months recently).

j. Subarachnoid hemorrhage (SAH) is known (eg, nausea, stiff neck, thunder clap headache ["worst headache of my life], vomiting).

k. Vascular abnormalities are suspected or known with **ANY** of the following:

i. Aneurysm is suspected with isolated 3rd nerve palsy (oculomotor) **AND** pupil involvement.

ii. Headache and **ANY** of the following:

A. Associated with exercise, exertion, sexual activity or forced breathing through closed airways (Valsalva).

B. Thunderclap headache is known, underlying vascular abnormality (eg, arteriovenous malformation, dural venous fistula, venous varices) is suspected **AND** initial brain imaging is negative.

iii. Pulsatile tinnitus is known and vascular etiology (eg, atherosclerotic disease, dural arteriovenous fistulas, dural vein thrombosis) is suspected.

iv. Vascular malformation (arteriovenous malformation [AVM] or dural arteriovenous fistula) is suspected **AND** prior imaging is non-diagnostic or indeterminate.

l. Vasculitis, magnetic resonance angiography (MRA) is **contraindicated or unavailable** and **EITHER** of the following:

i. Large vessel vasculitis (giant cell arteritis, Takayasu arteritis) and intracranial involvement is suspected.

ii. Primary or secondary, is suspected or known, with initial laboratory work up (eg, c-reactive protein [CRP], erythrocyte sedimentation rate [ESR] or serology) **AND** neurological signs (eg, dizziness, numbness, pain).

m. Venous thrombosis (dural sinus thrombosis) is suspected (eg, cranial nerve palsy, headache, seizures) and MRV is **contraindicated or unavailable**.

n. Vertebrobasilar insufficiency (VBI) is suspected or known **AND** there are new or worsening symptoms (eg, dizziness, headaches, vertigo).

References: [7] [11] [12] [13] [5] [3] [8] [9] [4] [14] [6] [10]

2. Intracranial vascular disease is known and **ANY** of the following:

a. Aneurysm or vascular malformation is known.

b. Carotid or vertebral artery dissection is known, based on prior imaging, for follow-up within 3 to 6 months for evaluation of recanalization and/or to guide anticoagulation treatment.

c. Moyamoya disease, reversible cerebral vasoconstriction syndrome (RCVS) or vasculitis is known, based on clinical exam or prior imaging.

d. Vertebrobasilar insufficiency is known **AND** symptoms (eg, dizziness, numbness, pain) are new or worsening.

References: [7] [3]

3. Pre-procedural evaluation, to guide treatment planning or post-surgical assessments (within 90 days of procedure) for evaluation of complications or disease recurrence

CTA Brain and Head Summary of Changes

CTA Brain and Head guideline had the following version changes from 2024 to 2025:

Table 1. 2025 CTA Brain Summary of Changes

Date	Type of Change	Summary
08/20/2025	Mid-Cycle	• Added examples throughout for clarity • Added parameters (underlined below) for clarity to the following: ▪ "Moyamoya disease, reversible cerebral vasoconstriction syndrome (RCVS) or vasculitis is known, based on clinical exam or prior imaging" under " Intracranial vascular disease" • Added time frame for "post-surgical assessment" in Pre-Procedural indication • Removed "aneurysm is treated" from "Aneurysm or vascular malformation is known" under "Intracranial vascular disease is known"
05/16/2025	Annual	• Added the following to keep in line with current evidence: ▪ "Carotid or vertebral artery dissection is known" under "Intracranial vascular disease" per the evidence ▪ "Cerebral vasospasm is suspected" per the evidence ▪ "Glomerular filtration rate" to "Renal impairment" under Contraindications ▪ "Horner's syndrome" per the evidence ▪ "one time vascular study" to end of "Spontaneous coronary arteries dissection" under "Aneurysm screening" per the evidence ▪ Under "Aneurysm screening" new criteria: ◦ "Bicuspid aortic valve" ◦ "Ehlers-Danlos, vascular syndrome" ◦ "Takayasu's arteritis" • Removed the following as current evidence no longer supports the indication: ▪ Combination studies as they are redundant ▪ "Prior CTA Brain is non-diagnostic or indeterminate" as it is too broad ▪ Under "Aneurysm screening" due to lack of evidence ◦ "Adult with polycystic kidney disease" ◦ Age parameter from "aortic coarctation"` ▪ "Vascular abnormality demonstrated on imaging and further evaluation is needed" as it is too broad.

CTA Brain/Head Procedure Codes

Table 1. CTA Brain and/or Head Associated Procedure Codes

CODE	DESCRIPTION
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing

CTA Brain/Head Definitions

Aneurysm refers to weakness in an artery wall, allowing it to abnormally balloon out or widen.
Aortic Coarctation is a congenital narrowing of the aorta, typically located near the ligamentum arteriosum just distal to the origin of the left subclavian artery.
Arteriovenous fistula (AVF) is an abnormal connection between an artery and a vein. It happens when one or more arteries are directly connected to one or more veins or venous spaces called sinuses.
Arteriovenous malformation (AVM) are congenital high-flow vascular malformations characterized by abnormal shunting of blood from high-flow feeding arteries to low-resistance veins via a cluster of aberrant blood vessels termed a central nidus, bypassing the normal capillary bed.
Bicuspid aortic valve is a congenital heart defect where the aortic valve has only two cusps (a pointed or raised projection on a structure) instead of the normal three.
Cerebral vasospasm is a condition where blood vessels in the brain narrow, restricting blood flow. This narrowing, or vasoconstriction, can lead to reduced oxygen and nutrient supply to brain tissue, potentially causing injury or damage, according to the National Institutes of Health (NIH).
Computed tomography angiography (CTA) is a medical test that combines a computed tomography (CT) scan with an injection of a special dye to produce pictures of blood vessels and tissues in a part of the body.
Computed tomography venography (CTV) is a technique targeted to assess venous anatomy, determine venous patency and delineate collateral circulation, often using contrast material.
Dissection refers to the separation of the layers within the wall of an artery, most commonly the aorta, due to a tear in the intimal layer, leading to the formation of a false lumen.
Dural venous sinuses are valveless channels formed by the separation of the periosteal and meningeal layers of the dura mater, responsible for draining venous blood from the brain and cerebrospinal fluid (CSF) into the internal jugular veins.
Ehlers-Danlos syndrome is a group of hereditary connective tissue disorders that manifests clinically with skin hyperelasticity, hypermobility of joints, atrophic scarring and fragility of blood vessels.
Fibromuscular dysplasia is a rare blood vessel disorder that causes arteries to narrow and grow larger. FMD occurs when the strong, flexible cells in arteries are replaced with less strong, less flexible cells. This makes the arteries stiffer and more likely to be damaged.
Giant cell arteritis is a systemic inflammatory vascular disease that predominantly affects adults over 50 years old, characterized by granulomatous inflammation of the blood vessel walls, particularly the branches of the carotid and vertebral arteries, and is associated with symptoms such as headache, jaw claudication, visual disturbances, and tender/thickened temporal arteries.
Hemorrhage is a copious or heavy discharge of blood from the blood vessels.

Horner's syndrome is a syndrome marked by sinking in of the eyeball, constriction of the pupil (miosis), drooping of the upper eyelid (ptosis), face vasodilation and anhidrosis (abnormal deficiency or absence of sweating) caused by paralysis of the cervical sympathetic nerve fibers on the affected side.
Indeterminate is something that is not established, or uncertain.
Intraparenchymal hemorrhage (IPH) is bleeding that occurs within the brain parenchyma, which is the functional tissue in the brain made up of neurons and glial cells.
Ischemia is a deficient supply of blood to a body part (such as the heart or brain) due to obstruction of the inflow of arterial blood.
Ischemic stroke occurs when the blood supply to part of the brain is interrupted or reduced, preventing brain tissue from getting oxygen and nutrients. Brain cells begin to die in minutes.
Loeys-Dietz Syndrome (LDS) is a genetic disorder that affects the connective tissue in the body.
Magnetic resonance angiogram (MRA) is a test that uses a magnetic field and pulses of radio wave energy to provide images of blood vessels inside the body, allowing for evaluation of blood flow and blood vessel wall condition. MRA is used to look for aneurysms, clots, tears in the aorta, arteriovenous malformations and stenosis caused by plaque in the carotid arteries (neck) or blood vessels leading to the lungs, kidneys or legs.
Magnetic resonance venogram (MRV) is a diagnostic procedure that uses a combination of a large magnet, radiofrequencies, and a computer to produce detailed images of organs and structures within the body. An MRV uses magnetic resonance technology and intravenous (IV) contrast dye to visualize the veins. Contrast dye causes the blood vessels to appear opaque on the X-ray image, allowing the visualization the blood vessels being evaluated. MRV is useful in some cases because it can help detect causes of leg pain other than vein problems.
Moyamoya disease is a rare, chronic, and progressive condition that causes the blood vessels that supply blood to the brain to narrow. The internal carotid arteries in the skull become blocked or narrowed.
Non-diagnostic is a result that does not lead to a confirmed diagnosis.
Pediatric approximate ages are defined by the US Department of Health (USDH), the Food and Drug Administration (FDA), and the American Academy of Pediatrics (AAP) as the following:

1. Infancy, between birth and 2 years of age
2. Childhood, from 2 to 12 years of age
3. Adolescence, from 12 to 21 years of age, further defined by the AAP into:
    a. Early (ages 11–14 years)
    b. Middle (ages 15–17 years),
    c. Late (ages 18–21 years)

d. Older ages may be appropriate for children with special healthcare needs.

Polycystic kidney disease (PKD) is a genetic disorder that causes fluid-filled cysts to grow in the kidneys. The cysts can grow very large and cause the kidneys to enlarge and lose function. PKD cysts can reduce kidney function and lead to kidney failure.
Pseudotumor cerebri is a disorder of elevated spinal fluid pressure in the brain that can lead to progressive loss of vision over time.
Pulsatile tinnitus is a rhythmic pulsing noise in one or both ears that occurs in the absence of external sound and tends to be synced with the heartbeat.
Reversible cerebral vasoconstriction syndrome (RCVS) is a group of disorders characterized by severe headaches and a narrowing of the blood vessels in the brain. RCVS is reversible and patients often recover within three months.
Screening is the systematic application of a test or inquiry to identify individuals at sufficient risk of a specific disorder to warrant further investigation or direct preventive action, among persons who have not sought medical attention for symptoms of that disorder.
Sickle cell disease is a chronic anemia that occurs in individuals who are homozygous for the gene controlling hemoglobin S (eg, African or Mediterranean descent). It is characterized by destruction of red blood cells and by episodic blocking of blood vessels by the adherence of sickle cells to the vascular endothelium. This causes the serious complications of the disease (such as organ failure).
Spontaneous coronary artery dissection (SCAD) is a tear in the wall of a coronary artery. It's an emergency condition that can slow or block blood flow to the heart. This can lead to a heart attack, heart rhythm problems or sudden death.
Stroke, sometimes called a brain attack, occurs when something blocks blood supply to part of the brain or when a blood vessel in the brain bursts. In either case, parts of the brain becomes damaged or dies. A stroke can cause lasting brain damage, long-term disability or even death.
Subarachnoid hemorrhage (SAH) is defined as bleeding into the subarachnoid space surrounding the brain, most commonly caused by the rupture of cerebral aneurysms.
Takayasu's arteritis is a chronic inflammatory disease especially of the aorta and its major branches (the brachiocephalic artery and left common carotid artery) that result in progressive stenosis, occlusion and aneurysm formation marked by diminution or loss of the pulse (as in the arm) and ischemic symptoms.
Third nerve palsy can impair eye movements, the response of pupils to light, or both. These palsies can occur when pressure is put on the nerve or the nerve does not get enough blood.
Thrombosis is the formation of a blood clot (partial or complete blockage) within blood vessels, whether venous or arterial, limiting the natural flow of blood and resulting in clinical sequela.
Thunderclap headache is headache characterized by sudden, severe head pain, often described as "the worst headache of my life." It is sometimes called a sentinal headache. The pain usually peaks within five minutes, persists for at least one hour and may be accompanied by nausea

or vomiting.is an uncommon type of headache that strikes suddenly, the pain peaks within 60 seconds and can warn of potentially life-threatening conditions (usually having to do with bleeding in and around the brain).

Transient ischemic attack (TIA) is a brief interruption of the blood supply to the brain that causes a temporary impairment of vision, speech or movement. The episode usually lasts for just a few moments but may be a warning sign of a full scale stroke.

Vascular malformations are abnormalities in the development of blood vessels, lymph vessels or both, which can be present at birth or become apparent later in life. These malformations can involve arteries, veins, capillaries or lymphatic vessels, and can lead to various symptoms depending on the location and type of malformation.

Valsalva maneuver is the action of attempting to exhale with the nostrils and mouth or the glottis, while closed. This increases pressure in the middle ear and the chest, as when bracing to lift heavy objects and is used as a means of equalizing pressure in the ears. It can be used to diagnose or treat certain cardiovascular conditions.

Vasculitis involves inflammation of the blood vessels. The inflammation can cause the walls of the blood vessels to thicken, which reduces the width of the passageway through the vessel. If blood flow is restricted, it can result in organ and tissue damage.

Venous thrombosis or compression is the formation of a blood clot in a blood vessel.

Vertebrobasilar insufficiency (VBI) is defined by inadequate blood flow through the posterior circulation of the brain, supplied by the 2 vertebral arteries that merge to form the basilar artery. VBI affects the parts of the brain that control movement and balance.

CTA Brain/Head References

[1] American College of Radiology. (2023). ACR Manual on Contrast Media. *American College of Radiology*. Retrieved: April 2025. https://www.acr.org/-/media/ACR/Files/Clinical-Resources/Contrast_Media.pdf

[2] Canan, A., Rajah, P. & Abbara, S. (2023). Cardiac computed tomography. G.N. Levine, (Ed.). *Cardiology Secrets* (6), (pp. 85-96). Philadelphia, PA: Elsevier.

[3] Fukushima, Y., Fushimi, Y., . . . Nakamoto, Y. (2022). Evaluation of moyamoya disease in CT angiography using ultra-high-resolution computed tomography: Application of deep learning reconstruction. *European Journal of Radiology, 151*, 110294.

[4] Gladstone, D.J., Lindsay, M.P., . . . Grahan, B.R. (2021). Canadian Stroke Best Practice Recommendations: Secondary Prevention of Stroke Update 2020. *Canadian Journal of Neurological Sciences*, 1-23.

[5] Ivanidze, J. & Sanelli, P.C. (2021). Vasospasm. *Neuroimaging Clinics of North America, 31*(2), 147-155.

[6] Jain, V., Policeni, B., . . . Burns, J. (2023). ACR Appropriateness Criteria Tinnitus: 2023 Update. *Journal of the American College of Radiology, 20*(11), S574-S591.
[7] Ledbetter, L.N., Burns, J., . . . Corey, A.S. (2021). ACR Appropriateness Criteria Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage. *Journal of the American College of Radiology, 18*(11S), S283-S304.
[8] Liu, Y., Liang, H., . . . Chen, D. (2022). Reversible Cerebral Vasoconstriction Syndrome (RCVS): Etiologies Related Radiological Findings. *Advances in Neurology and Neuroscience Research, 3*, 1000016.
[9] Mallon, D., Doig, D., . . . Tona, F. (2020). Neuroimaging in Sickle Cell Disease: A Review. *Journal of Neuroimaging, 30*(6), 725-735.
[10] Owen, C.E., Yates, M., . . . Mackle, S.L. (2023). Imaging of giant cell arteritis – recent advances. *Best Practice & Research: Clinical Rheumatology, 37*(1), Article: 101827.
[11] Pannell, J.S., Corey, A.S., . . . Burns, J. (2024). ACR Appropriateness Criteria Cerebrovascular Diseases-Stroke and Stroke-Related Conditions. *Journal of the American College of Radiology, 21*(6), S21-S64.
[12] Shih, R.Y., Burns, J., . . . Corey, A.S. (2021). ACR Appropriateness Criteria Head Trauma: 2021 Update. *Journal of the American College of Radiology, 18*(5S), S13-S36.
[13] Sporns, P.B., Psychogios, M., . . . Morotti, A. (2021). Neuroimaging of Acute Intracerebral Hemorrhage. *Journal of Clinical Medicine, 10*(5), 1086.
[14] Utukuri, P.S., Shih, R.Y., . . . Burns, J. (2023). ACR Appropriateness Criteria Headache: 2022 Update. *Journal of the American College of Radiology, 20*(5), S70-S93.

Disclaimer section

Purpose

The purpose of the HealthHelp's clinical guidelines is to assist healthcare professionals in selecting the medical service that may be appropriate and supported by evidence to safely improve outcomes. Medical information is constantly evolving, and HealthHelp reserves the right to review and update these clinical guidelines periodically. HealthHelp reserves the right to include in these guidelines the clinical indications as appropriate for the organization's program objectives. Therefore the guidelines are not a list of all the clinical indications for a stated procedure, and associated Procedure Code Tables may not represent all codes available for that state procedure or that are managed by a specific client-organization.

Clinician Review

These clinical guidelines neither preempt clinical judgment of trained professionals nor advise anyone on how to practice medicine. Healthcare professionals using these clinical guidelines

are responsible for all clinical decisions based on their assessment. All Clinical Reviewers are instructed to apply clinical indications based on individual patient assessment and documentation, within the scope of their clinical license.

Payment

The use of these clinical guidelines does not provide authorization, certification, explanation of benefits, or guarantee of payment; nor do the guidelines substitute for, or constitute, medical advice. Federal and State law, as well as member benefit contract language (including definitions and specific contract provisions/exclusions) take precedence over clinical guidelines and must be considered first when determining eligibility for coverage. All final determinations on coverage and payment are the responsibility of the health plan. Nothing contained within this document can be interpreted to mean otherwise.

Registered Trademarks (®/™) and Copyright (©)

All trademarks, product names, logos, and brand names are the property of their respective owners and are used for purposes of information and/or illustration only. Current Procedural Terminology (CPT)®™ is a registered trademark of the American Medical Association (AMA). No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise, without permission from HealthHelp.

National and Local Coverage Determination (NCD and LCD)

NOTICE
To ensure appropriate review occurs to the most current NCD and/or LCD, always defer to https://www.cms.gov/medicare-coverage-database/search.aspx.

Background

National Coverage Determinations (NCD) and Local Coverage Determinations (LCD) are payment policy documents outlined by the Centers for Medicare and Medicaid Services (CMS) and the government's delegated Medicare Audit Contractors (MACs) that operate regionally in jurisdictions.
CMS introduced variation between different jurisdictions/Medicare Audit Contractors (MACs) and their associated covered code lists with the transition to ICD 10. The variation resulted in jurisdictions independently defining how codes are applied for exclusions, limitations, groupings, ranges, etc. for the medical necessity indications outlined in the NCD and LCD. Due to this

variation, there is an inconsistent use/application of codes and coverage determinations across the United States between the different MACs.
In addition, **WITHOUT** notice, CMS can change the codes that indicate medical necessity and the format of the coverage determinations/associated documents (eg, Articles). This is an additional challenge for organizations to keep up with ongoing, unplanned changes in covered codes and medical necessity indications.

Medical Necessity Codes

Due to the variation in code application between jurisdictions/MACs and that updates can happen without notification, HealthHelp is not able to guarantee full accuracy of the codes listed for any Coverage Determination, and advises that prior to use, the associated Coverage Determination Articles are reviewed to ensure applicability to HealthHelp's programs and any associated NCDs and LCDs.

For Internal Use Only:

11248 11249 11253 11282 11325 11328 11333 11349 11350 11351 11352 11354 11355 11356 11358 11359 11360 11361 11362 11365 11366 11367 11368 11369 11370 11374 11375 11394 11395 11396 11565