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2024 Computed Tomography Angiography (CTA) Brain/Head

Diagnostic Imaging

CTA-Brain-HH

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Table of Contents

Computed Tomography Angiography (CTA) Brain/Head

NCD 220.1
See also, **NCD 220.1**: Computed Tomography at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

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: [16] [25]
        i. Adult with polycystic kidney disease (PKD) [19] [15]
        ii. Age is older than 10 years old **AND** aortic coarctation is known. [5]
        iii. Fibromuscular dysplasia (FMD) [2]
        iv. First-degree relatives (child, parent, sibling) with a history of intracranial aneurysm **AND** when **EITHER**: (*__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.
        v. Loeys-Dietz syndrome, repeat imaging at least every 2 years [7]
        vi. Spontaneous coronary arteries dissection (SCAD)
    b. Cerebral intraparenchymal hemorrhage is known and underlying vascular abnormality is suspected. [26] [27]
    c. Benign intracranial hypertension (pseudotumor cerebri) determination from dural sinus thrombosis and **magnetic resonance venography (MRV) is contraindicated or unavailable**.

d. Giant cell arteritis and intracranial involvement is suspected. [23] [22]

e. Moyamoya disease is suspected. [8]

f. Reversible cerebral vasoconstriction syndrome (RCVS) is suspected. [18]

g. Sickle cell disease (hemorrhagic or ischemic), **magnetic resonance angiography (MRA) is contraindicated or unavailable** and **ANY** of the following: [21]

   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.

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

i. Subarachnoid hemorrhage (SAH) is known. [26] [16]

j. 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 issuspected **AND** inital brain imaging is negative. (*__NOTE__: *Negative brain CT, less than 6 hours after headache onset, excludes subarachnoid hemorrhage in neurologically intact patients*.)

   iii. Pulsatile tinnitus is known and vascular etiology is suspected.

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

k. Vasculitis (eg, giant cell arteritis, Takayasu's arteritis), 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).

l. Venous thrombosis (dural sinus thrombosis) is suspected and **MRV is contraindicated or unavailable**. [16] [1]

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

2. Intracranial vascular disease is known and **ANY** of the following:
    a. Aneurysm or vascular malformation is known **OR** aneurysm was treated. [16]
    b. Moyamoya disease, reversible cerebral vasoconstriction syndrome (RCVS) or vasculitis is known.
    c. Vascular abnormality demonstrated on imaging and further evaluation is needed. [28]
    d. Vertebrobasilar insufficiency is known **AND** symptoms (eg, dizziness, numbness, pain) are new or worsening.
3. Peri-procedural brain procedure care to guide invasive procedure planning or post-operative follow-up.
4. Prior CTA Brain imaging is non-diagnostic or indeterminate. (*__NOTE__: *One follow-up is appropriate to evaluate for changes since preceding imaging finding[s]. Further surveillance is appropriate when lesion is specified as "highly suspicious" or there is a change since last exam.*)

CTA Brain/Head and CT Brain/Head Combination

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

1. Headache is acute, with sudden onset, and vascular abnormality history **OR** history of first-degree relative (child, parent, sibling) with aneurysm. [28]
2. Headache associated with exercise, exertion, sexual activity or valsalva and magnetic resonance imaging (MRI) is **contraindicated or unavailable**. [17] [28]
3. Sickle cell disease (hemorrhagic or ischemic), magnetic resonance angiography (MRA) is **contraindicated or unavailable** and **ANY** of the following: [21]
    a. Neurological signs (eg, dizziness, numbness, pain)
    b. Stroke risk is increased when transcranial doppler velocity is more than 200.
4. Stroke, ischemic, or transient ischemic attack (TIA) occurred recently (within last 6 months) and MRI is **contraindicated or unavailable**. [9] [12] [25]
5. Venous thrombosis (dural sinus thrombosis) is suspected and MRI is **contraindicated or unavailable**. [16] [1]

CTA Brain/Head and CTA Neck Combination

Computed tomography angiography (CTA) of the brain/head **combined** with CTA of the neck is considered medically appropriate when the documentation demonstrates **ANY** of the following: [3]

1. Asymptomatic **AND** neck ultrasound or carotid duplex imaging is abnormal, non-diagnostic or indeterminate (eg, aberrant flow direction in the carotid or vertebral arteries, carotid stenosis 70% or more, technically limited study). [20]
2. Carotid or vertebral artery dissection is suspected, due to trauma **OR** spontaneous weakness of vessel wall. [11] [13]
3. Carotid or vertebral artery dissection is known, for evaluation of recanalization and/or to guide anticoagulant treatment: follow-up within 3 to 6 months.
4. Pulsatile tinnitus is known **AND** vascular etiology is suspected. [14]
5. Stroke, ischemic, or transient ischemic attack (TIA) occurred recently (within last 6 months). [9] [12]
6. Symptomatic (eg, blurred vision, confusion, memory loss) **AND** neck ultrasound or carotid duplex imaging is abnormal, non-diagnostic or indeterminate (eg, aberrant flow direction in the carotid or vertebral arteries, carotid stenosis 50% or more, technically limited study).
7. Vertebrobasilar insufficiency (VBI) is suspected or known and symptomatic (eg, abnormal speech, ataxia, bilateral weakness, blindness, diplopia, dizziness, headaches, vertigo, vomiting).

Combination CTA Brain/Head, CTA Neck and CT Brain/Head

Computerized tomography angiography (CTA) of the brain/head, **combined** with CTA of the neck **AND** CT brain/head, is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Carotid or vertebral artery dissection is suspected, when neurological deficits (eg, abnormal reflexes, limb weakness, mental status change) are known.
2. Stroke, ischemic or transient ischemic attack (TIA) occurred recently. [10] [12] [25]

CTA General Contraindications

Computed tomography angiography (CTA) is contraindicated for **ANY** of the following: [4] [6] [29]

- Contrast allergy

- Heart failure is decompensated.
- Hemodynamic instability (eg, abnormal laboratory values, blood pressure instability)
- Renal impairment (glomerular filtration rate is 30 mL/min/1.73m^2)
- Protocol can **NOT** be followed (eg, technical or related to individual).

CTA Brain/Head Summary of Changes

CTA Brain/Head guideline had the following version changes from 2023 to 2024:

- Removed the following as research no longer supports the indication:
  - "Aneurysm, intracranial, for evaluation"
  - "Acute, with sudden onset" under "Headache"
- Mid-cycle update: added Pediatric Preamble

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 birth defect in which a part of the aorta is narrower than usual.
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) is a tangle of abnormal blood vessels connecting arteries and veins.
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 matierial.
Dissection is the abnormal and usually abrupt formation of a tear or separation of the layers inside the wall of an artery.

Dural venous sinuses are a group of sinuses or blood channels that drains venous blood circulating from the cranial cavity. It collectively returns deoxygenated blood from the head to the heart to maintain systemic circulation.
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 arterial inflammation often involving the temporal arteries that may lead to blindness when the ophthalmic artery and its branches are affected, characterized by the formation of giant cells and can be accompanied by fever, malaise, fatigue, anorexia, weight loss and arthralgia.
Hemorrhage is a copious or heavy discharge of blood from the blood vessels.
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:

- Infancy, between birth and 2 years of age

- Childhood, from 2 to 12 years of age
- Adolescence, from 12 to 21 years of age, further defined by the AAP into:
    1. Early (ages 11–14 years)
    2. Middle (ages 15–17 years),
    3. Late (ages 18–21 years)
    4. 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 does not diagnose the illness. The goal is early detection and lifestyle changes or surveillance, to reduce the risk of disease, or to detect it early enough to treat it most effectively.
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 become damaged or die. A stroke can cause lasting brain damage, long-term disability, or even death.
Subarachnoid hemorrhage (SAH) is bleeding in the space that surrounds the brain.
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 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.
Valsalva maneuver is the action of attempting to exhale with the nostrils and mouth or the glottis, 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.
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.
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

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