

MRI Cervical Spine

Diagnostic Imaging

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MRI Cervical Spine



NCD 220.2

See also, **NCD 220.2**: Magnetic Resonance Imaging at <https://www.cms.gov/medicare-coverage-database/search.aspx> if applicable to individual's healthplan membership.

Guideline

Magnetic resonance imaging (MRI) of the cervical spine may be appropriate when the medical record demonstrates **ANY** of the following:

- Arnold-Chiari malformation with **ANY** of the following: ***NOTE**: *Any combination of cervical/thoracic/lumbar MRI may be appropriate for initial imaging and pre operatively, see below for combination study indications. [50]*
 - Achondroplasia ***NOTE**: *A cervical spine MRI to assess the craniocervical junction should be completed as early as possible, even when asymptomatic.*
 - Arnold-Chiari I malformation follow-up imaging after initial diagnosis, **WITHOUT** syrinx or hydrocephalus and symptoms or exam findings suggest spinal cord pathology.
 - Arnold-Chiari II , III or IV malformation follow-up evaluation
- Cancer is known or suspected with **ANY** of the following: ***NOTE**: *MRI is preferred, CT may be appropriate for characterization. [47] [17] [6] [20] [40]*
 - Bone scan demonstrates metastasis.
 - Leptomeningeal carcinomatosis (LC) is suspected. ***NOTE**: *Any combination of cervical/thoracic/lumbar MRI may be appropriate.*
 - Neurologic deficit, focal, is new or physical or imaging findings suggesting spinal tumor.
 - Metastatic tumor is suspected. ***NOTE**: *Any combination of cervical/thoracic/lumbar MRI may be appropriate.*
 - Neck pain or radiculopathy is new or worsening and a history of malignancy.
 - Prior surveillance follow-up imaging is inconclusive (**NO** further surveillance imaging thereafter unless new symptoms eg, new or increasing pain, neurological deficit).
 - Staging, initial or re-staging evaluation

- Compression fracture(s) are suspected, new or known, with worsening neck pain and **ANY** of the following: [47] [26]
 - Cancer history for a follow-up MRI in 6 to 8 weeks after initial indeterminate imaging.
 - Neurologic deficit, focal, is new.
 - Preprocedure planning or if the results are needed for treatment planning.
- Cord compression is suspected with neurological deficits that are new or progressing.
- Infection is suspected from clinical signs (eg, elevated white blood cell count, fever, pain localized to site) or prior imaging is suspicious for infection. [43] [35] [32] [16]
- Inflammatory disease or atlantoaxial instability is known or suspected, and **ANY** of the following: [30]
 - Atlantoaxial articulation degeneration-prone disorder (eg, Down syndrome, Marfan syndrome) with neurological symptoms, abnormal neurological exam or cervical spine X-ray(s) that are nondiagnostic or inconclusive.
 - Rheumatoid arthritis with neurologic symptoms or X-ray demonstrates subluxation.
***NOTE:** *Initial imaging should be a lateral X-ray in flexion and neutral. MRI is indicated with negative X-rays when neurological deficit is present or symptoms suggest cervical instability.*
 - Spondyloarthropathies are known or suspected with X-ray(s) non diagnostic or indeterminate and completed rheumatology evaluation. [2] [9]
- Multiple Sclerosis (MS) is suspected or known with **ANY** of the following: ***NOTE:** *Any combination of brain/cervical/thoracic/lumbar MRI may be appropriate, see below for the combination study indications.* [38] [31] [18] [22]
 - Brain MRI is normal, but there is a strong clinical suspicion of MS.
 - Brain MRI findings are inconclusive (eg, aging).
 - Cervical spinal cord disease symptoms (eg, focal neurologic deficit, Lhermitte sign) are new or worsening.
 - Primary progressive MS (PPMS) is suspected from clinical presentation.
 - Prior brain MRI suggests MS.
- Myelopathy is suspected for evaluation with neurological deficits or progressing symptoms (eg, hand dysfunction, numbness, coordination difficulties). [3] [15] [33] [53]
- Immune system suppression-related (eg, chemotherapy, HIV, leukemia) spinal condition is suspected, from symptoms or demonstrated on prior imaging.

- Pain in the neck, with **ANY** of the following: [35] [56] [33]
 - Cancer is suspected.
 - Electromyography (EMG) or nerve conduction study is abnormal or suspicious for radiculopathy. ***NOTE:** *An EMG is **not** recommended to determine the cause of axial lumbar, cervical or thoracic spine pain.*
 - Infection is suspected (eg, fever, elevated white blood cell count)
 - Inflammation is suspected **AND** no neurological defect **AND** either:
 - Conservative management (eg, supervised exercise or physical therapy, analgesia, etc) for at least 6 weeks in the last 6 months **WITHOUT** improvement
 - Conservative management attempted (in last 6 months) with new or worsening symptoms
 - Neurologic deficits (eg, bladder/bowel dysfunction, gait abnormalities, pathologic reflexes) are new or worsening.
 - Pediatric population with **ANY** of the following: ***NOTE:** *Conservative care is **NOT** required in presence of "Red flags."*
 - Neck pain with suspected cancer, infection or inflammation.
 - X-ray(s) is nondiagnostic or indeterminate and any "Red flag" is present.¹
 - Prior imaging is indeterminate and further clarification needed for treatment planning.
- Peri-procedural planning to guide invasive procedure and postoperative follow-up care and **ANY** of the following:
 - Cerebrospinal fluid (CSF) leak is suspected from history/physical (eg, headache following lumbar puncture, persistent clear rhinorrhea following a head injury or other intracranial issues, spontaneous (idiopathic) intracranial hypotension (SIH)).
 - Neurologic deficits that are new, residual or worsening after spine procedure.
 - Post procedure 6 months or less, for follow-up surveillance or suspected complications.
 - Preoperative planning or postoperative evaluation when complications are suspected.
- Syrinx or syringomyelia is suspected with **ANY** of the following:[1]
 - Neurologic symptoms and/or predisposing conditions (eg, Chiari malformation, prior trauma, severe spondylosis)

¹Red flags include: age 5 or younger; fever; limp (or refuses to walk); malaise; neurological abnormalities; pain is constant, lasts more than 4 weeks, radicular pain or sleep disrupting; stiffness and/or gelling after lying supine (eg, waking from sleep); postural condition (eg, kyphosis, scoliosis) history; and weight loss.

- Prior imaging demonstrates suspicious abnormality, but it is nondiagnostic or indeterminate.
- Syrinx is known and symptoms are new or progressing.
- Tethered cord or spinal dysraphism is suspected or known from initial imaging, neurological findings and/or high-risk cutaneous stigmata. [36] [4]
- Trauma or acute injury evaluation with **ANY** of the following: [23] [24] [26] [5]
 - Prior imaging (Xray or CT) is nondiagnostic or indeterminate or clinically unable to evaluate.
 - Spinal abnormalities (eg, ankylosing spondylitis, skeletal hyperostosis) are known.
***NOTE:** *Both a MRI and CT are appropriate.*
 - Neurological deficits (eg, bladder/bowel dysfunction, gait abnormalities, pathologic reflexes) are present.
 - National Emergency X-Radiography Utilization Study (NEXUS) or Canadian Cervical Rules (CCR) criteria for imaging are met for **ANY** of the following:
 - CT for initial imaging
 - CT or MRI for unstable spine treatment planning
 - CT is negative, and a MRI when spinal cord or nerve root injury, or being obtunded is suspected.
 - Conservative treatment attempted and new or worsening symptoms presented.

MR Myelogram

Magnetic resonance myelogram may be appropriate when the medical record demonstrates **ANY** of the following:

- Cerebral spinal fluid (CSF) leak is suspected or known (eg, headache after lumbar puncture, post spinal surgery, spontaneous intracranial hypertension (SIH)).
- Pre procedural planning (eg, nerve roots or dural sac evaluation) or surgeon's preference

Combination Studies with MRI Cervical Spine

Magnetic resonance imaging (MRI) of the cervical spine in combination with other imaging may be appropriate when the medical record demonstrates need for both tests being done simultaneously (eg, treatment planning depends on combination imaging) and **ANY** of the following: ***NOTE:** *The*

imaging combinations listed below include any combination of MRI of cervical, thoracic, and/or lumbar spine, unless otherwise noted.

- Arnold-Chiari malformation is suspected or known, for **ANY** of the following: [50]
 - Achondroplasia ***NOTE:** *A cervical spine MRI to assess the craniocervical junction should be completed as early as possible, even when asymptomatic.*
 - Arnold-Chiari malformation is known or suspected and age is 8 or younger.
 - Arnold-Chiari I baseline evaluation of spinal abnormalities, after initial diagnosis and when prior imaging is **NOT** done. ***NOTE:** *Imaging of the cervical, thoracic and lumbar spine, may be appropriate due to tethered cord and syringomyelia propensity.*
 - Arnold-Chiari I malformation follow-up imaging after initial diagnosis, **WITHOUT** syrinx or hydrocephalus and spinal cord pathology is suspected. ***NOTE:** *Imaging of the brain may also be appropriate.*
 - Arnold-Chiari II , III, or IV malformation follow-up evaluation.
- Cancer pre-therapy staging, recurrence surveillance (per NCCN recommended guidelines) or when metastasis is suspected. ***NOTE:** *5 or fewer concurrent studies to include CT or MRI of any area appropriate to primary or suspected cancer.*
- Cancer of the spine with bony and soft tissue involvement. ***NOTE:** *MRI with CT of the spine.*
- Cerebrospinal fluid (CSF) leak is suspected from history or symptoms (eg, history of spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture or spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea)
- Craniocervical junction is unstable. ***NOTE:** *MRI with CT of the spine.*
- Deformity of the spine that is progressive, for peri procedural planning.
- Fractures, pathologic or complex ***NOTE:** *MRI with CT of the spine.*
- Leptomeningeal carcinomatosis (LC) is suspected.
- Metastasis (drop) from brain or spine. ***NOTE:** *Imaging of the brain may also be appropriate.*
- Multiple sclerosis evaluation may be appropriate with **ANY** of the following imaging combinations:
 - Multiple sclerosis (MS) is suspected and brain MRI is non diagnostic. ***NOTE:** *Cervical and/or thoracic MRI.*
 - Neuromyelitis optica spectrum disorders (eg, recurrent optic neuritis or transverse myelitis) evaluation. ***NOTE:** *Brain and cervical and/or thoracic spine MRI.*

- Spinal disease surveillance at **ANY** of the following: ***NOTE:** *Brain and cervical/thoracic/lumbar spine MRI.*
 - 6 to 12 months after starting/changing treatment
 - Every 1 to 2 years while on disease modifying therapy; when stable follow-up every 2 to 3 years.
- Transverse myelitis is suspected from symptoms (eg, bilateral weakness, progressing autonomic dysfunction, sensory disturbance) ***NOTE:** *Cervical and/or thoracic MRI.*
- Treatment with disease modifying treatment monitoring (eg, baseline, change in therapy) or to assess extent of disease. ***NOTE:** *Brain and cervical and/or thoracic spine MRI.*
- Neurocutaneous syndrome tumor evaluation and surveillance.
- Ossification of posterior longitudinal ligament (OPLL) ***NOTE:** *MRI with CT of the spine.*
- Pediatric toe walking, with upper motor neuron signs (bone deformity, reflexia, spasticity) and suspected spinal cord pathology (eg, clawed toes, deformity in leg/foot, pes cavus). ***NOTE:** *Excludes tight heel cords.*
- Pediatric with neck pain and "Red Flags." ***NOTE:** *Conservative care is **NOT** required when red flags are present.*¹
- Peri procedural spinal combination studies may be appropriate with **ANY** of the following: **NOTE:** *Combinations include area-specific MRI and CT scans.*
 - Cancerous process of spine that has bony and soft tissue involvement.
 - Craniovertebral joint is unstable.
 - Fracture is complex or pathological.
 - Treatment planning depends on imaging (eg, medical vs. surgical approach)
 - Ossification of posterior longitudinal ligament (OPLL)
- Scoliosis when **ANY** of the following:
 - Age under 10 scoliosis survey for congenital scoliosis or juvenile idiopathic scoliosis.
 - Atypical curve (eg, kyphosis more than 30 degrees, left thoracic curve, short segment)
 - Deformity is progressive.
 - Neurological deficits are present.
 - Preoperative planning

- Treatment decision depends on imaging results.
- Spinal dysraphism or tethered cord is suspected or known based on prior imaging or high-risk stigmata, when anesthesia is required for imaging.
- Vertebral anomalies (eg, agenesis, butterfly, hemivertebrae) and neck pain.

MRI General Contraindications

MRI contraindications may include **ANY** of the following: [55] [46] [8]

- Safety, related to clinical status (first-trimester pregnancy, intravascular stents within recent 6 weeks, etc.)
- Safety, related to implanted devices (aneurysm clips, cochlear implant, insulin pump, etc.)



LCD 37373

See also, **LCD 37373**: MRI and CT Scans of Head and Neck at <https://www.cms.gov/medicare-coverage-database/search.aspx> if applicable to individual's healthplan membership.



LCD L35175

See also, **LCD L35175**: MRI and CT Scans of the Head and Neck at <https://www.cms.gov/medicare-coverage-database/search.aspx> if applicable to individual's healthplan membership.



LCD 35391

See also, **LCD 35391**: Multiple Imaging in Oncology at <https://www.cms.gov/medicare-coverage-database/search.aspx> if applicable to individual's healthplan membership.

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Procedure Codes

Table 1. MRI Cervical Spine Associated Procedure Codes

CODE	DESCRIPTION
72141	Magnetic resonance (eg, proton) imaging, spinal canal and contents, cervical; without contrast material
72142	Magnetic resonance (eg, proton) imaging, spinal canal and contents, cervical; with contrast material(s)
72156	Magnetic resonance (eg, proton) imaging, spinal canal and contents, without contrast material, followed by contrast material(s) and further sequences; cervical

Definitions/Key Terms

Achondroplasia is the most common cause of dwarfism, or significantly abnormal short stature.

Ankylosing spondylosis (spondylitis) is a chronic inflammatory disease that affects the spine, sacroiliac joints and often other joints (such as the shoulder) and is marked by pain and stiffness.

Arachnoiditis is inflammation of the thin membrane of the brain and spinal cord that lies between the dura mater and the pia mater.

Ataxia is the inability to coordinate voluntary muscular movements that is symptomatic of some central nervous system disorders and injuries and not due to muscle weakness.

Atlantoaxial are the anatomical structures that connect the atlas and the axis.

Basilar invagination occurs when the top of the second vertebrae moves upward. It can cause the opening in the skull where the spinal cord passes through to the brain (the foramen magnum) to close.

Blood patch is a procedure in which a small volume of autologous blood is injected into the epidural space to stop a leak of cerebrospinal fluid (CSF).

Brachial plexopathy is a form of peripheral neuropathy that occurs when there is damage to the brachial plexus.

Cerebrospinal fluid (CSF) leak is a leak of cerebrospinal fluid that results from a hole or tear in the dura, the outermost layer of the meninges.

Claudication is a condition in which cramping pain in the leg is induced by exercise, typically caused by obstruction of the arteries.

Claudication is a condition in which cramping pain in the leg is induced by exercise, typically caused by obstruction of the arteries.

Clinically isolated syndrome (CIS) A first episode in the course of Multiple Sclerosis (MS) consisting of neurologic symptoms that lasts at least 24 hours, and is caused by inflammation or demyelination (loss of the myelin that covers the nerve cells) in the central nervous system (CNS).

Cobb angle is a technique used in scoliosis to determine the degree of curvature of the spine.

C-reactive protein (CRP) is a protein present in blood serum in various abnormal states (such as inflammation or neoplasia).

Dermal sinus is a midline/paramedian stratified squamous epithelial-lined sinus tract extending inward from skin surface for variable distance.

Dermatomal distribution is the area of skin supplied by cutaneous branches of a single cranial or spinal nerve.

Discitis is an infection of the discs between the vertebra of the spine.

Down syndrome is a congenital condition characterized especially by developmental delays, usually mild to moderate impairment in cognitive functioning, short stature, upward slanting eyes,

a flattened nasal bridge, broad hands with short fingers and decreased muscle tone caused by trisomy of the human chromosome numbered 21.

Erythrocyte sedimentation rate (ESR) is a type of blood test to check for conditions that cause inflammation.

Grisel syndrome is the subluxation of the atlantoaxial joint from inflammatory ligamentous laxity following an infectious process.

Hydromyelia An abnormal widening of the central canal of the spinal cord that creates a cavity in which cerebrospinal fluid can accumulate.

Hydroxyringomyelia The development of a fluid-filled cyst (syrinx) within the spinal cord.

Infarction is an area of necrosis in a tissue or organ resulting from obstruction of the local circulation by a thrombus or embolus.

Inflammatory arthritis refers to joint inflammation caused by an overactive immune system.

Leptomeningeal carcinomatosis is cancer involving the pia mater and arachnoid mater.

Lipomeningocele A type of spina bifida is associated with an overlying fatty tumor at the base of the spinal cord.

Magnetic resonance imaging (MRI) is a noninvasive diagnostic technique that produces computerized images of internal body tissues and is based on nuclear magnetic resonance of atoms within the body induced by the application of radio waves.

Meningocele is a protrusion of meninges (any of the three membranes that envelop the brain and spinal cord) through a defect in the skull or spinal column.

Metastases is the spread of a disease-producing agency (such as cancer cells) from the initial or primary site of disease to another part of the body.

Multiple sclerosis (MS) is a demyelinating disease marked by patches of hardened tissue in the brain or the spinal cord and associated especially with partial or complete paralysis and jerking muscle tremor.

Myelocele is a congenital cleft of the spinal column with hernial protrusion of the meninges and sometimes the spinal cord (spina bifida) in which the neural tissue of the spinal cord is exposed.

Myelomeningocele is a congenital cleft of the spinal column with hernial protrusion of the meninges and sometimes the spinal cord (spina bifida) in which neural tissue of the spinal cord and the investing meninges protrude from the spinal column, forming a sac under the skin.

Myelopathy is a disease or disorder of the spinal cord or bone marrow.

Natalizumab is a prescription medicine used to treat relapsing forms of multiple sclerosis (MS).

Non-radiographic spondyloarthritis (nr-axSpA) is a condition where the sacroiliac (SI) joints do not show "definitive" damage on plain x-rays.

Osteomyelitis is an infectious, usually painful, inflammatory disease of bone. It is often bacterial in origin and may result in the death of bone tissue.

Osteoporosis is a condition that affects especially older women and is characterized by a decrease in bone mass with decreased density and enlargement of bone spaces producing porosity and fragility.

Paget's disease is a disease of the bone that interferes with the body's normal recycling process, in which new bone tissue gradually replaces old bone tissue. Over time, bones can become fragile and misshapen.

Psoriatic arthritis is a severe form of arthritis accompanied by inflammation, psoriasis of the skin or nails and a negative test for rheumatoid factor.

Radicular distribution is a type of pain that radiates from your back and hip into your legs through the spine, and travels along the spinal nerve root.

Reactive arthritis is an inflammatory arthritis that develops following a bacterial infection; is characterized by pain, swelling and stiffness of joints; may be accompanied by inflammation of the eyelids, skin or urinary tract; and typically lasts one year or less but may become chronic.

Refractory is resistance to treatment or cure.

Rheumatoid arthritis (RA) is an autoimmune disease (usually chronic) that is characterized by pain, stiffness, inflammation, swelling and sometimes destruction of the joints.

Sarcoma is a malignant tumor arising in tissue (such as connective tissue, bone, cartilage or striated muscle) of mesodermal origin.

Skeletal dysplasia is a group of conditions that affect bone development, neurological function and cartilage growth.

Spinal dysraphism is a general term used to describe a collection of congenital abnormalities that include defects in the vertebrae, and spinal cord or nerve roots.

Spondylarthropathy is any of several diseases affecting the joints of the spine.

Spontaneous intracranial hypotension (SIH) is a condition in which the fluid pressure inside the skull is lower than normal.

Surveillance is close watch kept over someone or something.

Syringomyelia is a chronic progressive disease of the spinal cord associated with sensory disturbances, muscle atrophy and spasticity.

Syrinx is a cerebrospinal fluid-filled cyst which collects inside of the spinal cord.



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