

	Clinical Protocol: Cervical Spine - Imaging	
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PROTOCOL OVERVIEW

This Clinical Protocol advises on indications and guidelines on Cervical Spine Imaging.

INDICATIONS

- **Plain X-rays**
 - Indicated for ANY ONE of the following:
 - History or suspicion of malignancy
 - History of severe trauma in the past
 - Neuromotor deficit
 - Workers' compensation or litigation cases
 - Age >50 years
 - History suspicious for ankylosing spondylitis
 - No improvement after 4 to 6 weeks of conservative treatment
 - Not indicated for ANY ONE of the following:
 - Most acute whiplash injuries
 - Neck pain and mild to moderate, non-progressing or improving radicular symptoms of relatively short duration, i.e., 6 to 8 weeks
 - Types of plain x-rays to order
 - AP and lateral of cervical spine are appropriate as initial screening.
 - Oblique views to visualize neural foramina should not be done routinely, as they double the dose of radiation exposure.
 - Flexion and extension views are not necessary after acute injuries
 - Odontoid views generally are not indicated.
 - Do not over interpret the findings of a plain x-ray of the spine, whether positive or negative
- **MRI, Cervical Spine**
- Cervical spine MRI may be indicated for **1 or more** of the following:
 - Bone neoplasm (benign or malignant) involving spine, known or suspected (eg, chondrosarcoma, chordoma, Ewing sarcoma family of tumors, giant cell tumor of bone, osteosarcoma, metastatic tumors), as indicated by **1 or more** of the following:
 - Initial evaluation or staging
 - Monitoring disease progression or response to treatment
 - Post-treatment surveillance
 - Histiocytic or dendritic cell neoplasm^[A] with involvement of vertebrae, known or suspected

- Localized neck pain and **1 or more** of the following:
 - Bone scan positive
 - Pain occurs mainly at night.
 - Persistent pain in patient older than 50 years
 - Personal history or concurrent diagnosis of malignancy
 - Weakness, rapidly progressing
 - Weight loss, unexplained
- Myelopathy signs or symptoms (e.g., motor weakness, bowel or bladder dysfunction)
- Primary central nervous system tumor (e.g., adult-type or pediatric-type diffuse glioma, ependymoma, medulloblastoma, other central nervous system embryonal tumor, primary central nervous system lymphoma, meningioma), and need for **1 or more** of the following:
 - Brain tumor, and need for evaluation for spinal involvement
 - Initial evaluation or staging
 - Monitoring disease progression or response to treatment
 - Post-treatment surveillance
- Primary non-central nervous system tumor, and need for diagnosis, staging, or monitoring of known or suspected spinal cord, spine, or leptomeningeal metastasis, as indicated by **1 or more** of the following:
 - Known spinal cord, spine, or leptomeningeal metastasis, and need for monitoring disease progression or response to treatment
 - Post-treatment surveillance
 - Suspected spinal cord, spine, or leptomeningeal metastasis (eg, due to myelopathy, pain, finding on other imaging), and need for evaluation, staging, or treatment planning
- Screening for central nervous system tumor in patient with high-risk genetic disorder or syndrome (e.g., neurofibromatosis type 2, von Hippel-Lindau syndrome)
- Cerebrospinal fluid leak, suspected
- Chiari malformation, suspected, as indicated by **1 or more** of the following
- : Babinski signs positive
- Gait disturbance
- Hyperreflexia
- Lower cranial nerve dysfunction such as vocal cord paralysis
- Nystagmus
- Paroxysmal headache or posterior cervical pain with Valsalva maneuvers (e.g., laughing, sneezing, coughing)
 - Congenital spinal conditions, suspected, as indicated by **1 or more** of the following
 - :Diastematomyelia (i.e., split cord malformation)
- Dorsal dermal sinus
- Hemangioma
- Hydromyelia
- Intradural lipoma
- Myelocoele
- Myelomeningocele
 - Infection, known or suspected (e.g., vertebral osteomyelitis, disk space infection, epidural abscess), as indicated by **ALL** the following
 - : Localized midline back pain
- Risk factors for spinal infection, as indicated by **1 or more** of the following:

- Bone scan or plain x-ray suggestive for infection
- C-reactive protein or erythrocyte sedimentation rate elevated
- Fever
- History of intravenous drug abuse, other source of infection, or recent invasive procedure
- Immunosuppression
- Positive blood culture
- Recent history of spinal surgery
- Tuberculosis, concurrent or suspected
- Inflammatory or demyelinating process, suspected (e.g., clinically isolated syndrome, multiple sclerosis, other demyelinating disease), as indicated by **1 or more** of the following
- : Multiple sclerosis, suspected, as indicated by **1 or more** of the following:
 - Ascending numbness or tingling (e.g., from foot to trunk)
 - Brown-Sequard syndrome
 - Conditions mimicking multiple sclerosis (e.g., Sjogren syndrome, systemic lupus erythematosus, antiphospholipid syndrome) cannot yet be excluded.
 - MRI of brain nondiagnostic for multiple sclerosis
 - Signs or symptoms of myelopathy or myelitis
- Transverse myelitis in spinal cord, suspected (idiopathic or in conjunction with multiple sclerosis), as indicated by **1 or more** of the following
 - Bilateral signs or symptoms of involvement of appropriate level of spinal cord
 - Clearly defined sensory level
 - Sudden onset of sensory, motor, and autonomic dysfunction attributable to appropriate level of spinal cord
- Klippel-Feil syndrome, suspected (i.e., fusion of 2 cervical vertebrae)
- Pain localized to neck or radicular in nature, subacute or chronic, as indicated by **ALL** the following:
 - Failure to improve after 6 or more weeks of nonoperative treatment, as indicated by **1 or more** of the following:
 - Activity modification
 - Exercise
 - Pharmacotherapy (e.g., analgesics, anti-inflammatory medications)
 - Physical therapy
 - Patient being considered for invasive treatment (e.g., epidural steroids, surgery)
 - Significant interference with daily function
 - Postoperative spinal complications, known or suspected, as indicated by **1 or more** of the following
 - : Postoperative hemorrhage or hematoma
 - Significant new neurologic findings (e.g., spinal cord impingement)
 - Significant new pain symptoms (e.g., recurrent or new radicular symptoms, delayed pain at fusion site)
 - Rheumatoid arthritis in cervical spine with suspected instability or cord compression, as indicated by **1 or more** of the following
 - : Atlantoaxial subluxation or impaction on plain x-ray
 - Evidence of myelopathy or progressive neurologic deficit
 - Subluxation of first and second cervical vertebrae (C1 and C2)
 - Scoliosis, as indicated by **1 or more** of the following
 - Congenital scoliosis

- Early-onset scoliosis (age 9 years or younger)
- Neurofibromatosis
- Presurgical planning for adolescent idiopathic scoliosis to assess possible neural axis malformation, as indicated by **1 or more** of the following:
 - Abnormal neurologic findings on clinical examination
 - Age at first visit 10 years or younger
 - Kyphosis at curve apex
 - Left-sided thoracic curvature
 - Male gender
 - Pain, moderate to severe
 - Rapid curve progression (ie, more than 1 degree per month)
 - Short segment curve (i.e., less than 6 vertebral segments)
 - Thoracic kyphosis 30 degrees or greater
 - Vertebral abnormalities (e.g., hemivertebrae, block vertebrae) detected on x-ray
- Spinal cord compression or myelopathy, suspected, as indicated by **1 or more** of the following
 - : Babinski signs positive
 - Fecal incontinence
 - Gait abnormality (e.g., spastic or ataxic)
 - Hoffman sign positive (i.e., thumb flexion and adduction upon flexion of long finger terminal phalanx)
 - Hyperreflexia or clonus
 - Motor weakness of upper extremity (eg, bilateral or involving multiple nerve roots)
 - Sensory or motor deficits, significant or progressive
 - Spasticity
 - Urinary urgency, frequency, retention, or overflow incontinence
- Spinal dysraphism, suspected, as indicated by **1 or more** of the following
 - For infant, as indicated by **1 or more** of the following:
 - Absent reflexes
 - Aplasia cutis congenita
 - Decreased spontaneous leg movement
 - Decreased urinary stream
 - Deviation of gluteal cleft
 - Foot asymmetry
 - Leg atrophy
 - Midline lumbosacral skin lesions (eg, atypical dimple, dermal sinus, lipoma, tail)
 - Unilateral lumbosacral hypertrichosis
 - For toddler: developmental delay in walking, abnormal gait
 - For older child: spasticity, hyperreflexia, bowel or bladder disturbance, including incontinence
 - Spinal stenosis of cervical spine, suspected, as indicated by **ALL** of the following
 - Patient being considered for invasive treatment(169)
- Progressive or disabling symptoms of cervical spine stenosis, as indicated by **1 or more** of the following:
 - Hyperactive reflexes
 - Muscle weakness
 - Sensory loss

- Spasticity
- Stereotactic spine radiotherapy treatment planning Syringomyelia in cervical spine, suspected, as indicated by **1 or more** of the following
 - Upper limb sensory loss in cape-like distribution
 - Weakness, muscle wasting, and sensory loss beginning in intrinsic muscles of hand
- Torticollis, as indicated by **ALL** the following
 - Age younger than 18 years
 - Initial CT scan normal or inconclusive
 - Nontraumatic etiology
 - Trauma or fracture of cervical spine, known or suspected, as indicated by **1 or more** of the following
 - : Age 65 years or older
 - Altered mental status
 - Child younger than 3 years with acute head trauma, and physical abuse suspected
 - Epidural hematoma, suspected
 - Fall from height greater than 3.3 feet (1 meter)
 - High clinical suspicion of acute spinal injury, as indicated by **ALL** the following:
 - Negative or indeterminate cervical spine x-ray or CT scan results
 - Symptoms, as indicated by **1 or more** of the following:
 - Midline cervical tenderness
 - Paresthesias of extremities
 - Ligamentous injury, suspected
 - Multiple traumatic injuries (e.g., concurrent injury to 2 or more body parts or systems)
 - Neurologic symptoms associated with traumatic mechanism of injury, as indicated by **1 or more** of the following:
 - Ejection from motorcycle
 - High-speed motor vehicle accident (greater than 50 mph (80.5 kph))
 - Intoxicated state
 - Minimal trauma in osteoporotic patient with suspected fragility fracture
 - Motor vehicle accident, with acute hyperflexion of spine over seat belt
 - Pediatric patient
 - Results of plain x-ray or CT scan nondiagnostic or show abnormal spine motion or burst fracture
 - Traumatic disk herniation, suspected(212)
 - Tuberculosis of spine, known or suspected, as indicated by **1 or more** of the following
 - : Diagnostic evaluation of suspected spinal tuberculosis
 - Preparation for surgical management
- Repeat evaluation of specific area or structure with same imaging modality, and **ALL** the following:
 - Clinical need for repeat imaging, as indicated by **1 or more** of the following:
 - Change in clinical status (eg, worsening symptoms or new associated symptoms), and findings may impact treatment
 - Need for interval reassessment that may impact treatment plan
 - Need for re-imaging either prior to or after performance of invasive procedure
 - Prior imaging results of specific area or structure with same imaging modality documented and available for comparison

- **CT Scan, Cervical Spine**
- Cervical spine CT scan may be indicated for **1 or more** of the following:
- Anatomy or structural defect evaluation needed, as indicated by **1 or more** of the following
 - Aneurysmal bone cyst
 - Chondrosarcoma
 - Chordoma
 - Hemangioma
 - Multiple myeloma coexistent
 - Nocturnal spine pain
 - Ossification of cervical spinal ligament (e.g., posterior longitudinal ligament, ligamentum flavum)
 - Osteochondroma
 - Osteoid osteoma
 - Paget disease coexistent, with neck pain, abnormal bone scan, or elevated alkaline phosphatase
 - Painful scoliosis
 - Plain x-rays abnormal (e.g., Klippel-Feil anomaly of fused vertebrae)
 - Cancer or neoplasm evaluation, staging, or surveillance needed, as indicated by **1 or more** of the following:
 - Anatomic guidance needed during percutaneous needle biopsy of lesion
 - Imaging evaluation needed, as indicated by **ALL** the following:
 - Localized midline cervical spine pain and **1 or more** of the following:
 - Bone scan positive
 - Myelopathy signs or symptoms (e.g., motor weakness)
 - Pain occurs mainly at night.
 - Personal history or concurrent diagnosis of malignancy
 - Spine pain persistent in patient older than 50 years
 - Weakness, rapidly progressing
 - Weight loss, unexplained
 - MRI contraindicated or not available
 - Infection, known or suspected, as indicated by **1 or more** of the following:
 - Abscess of soft tissue or muscle and **1 or more** of the following:
 - Monitoring treatment of abscess
 - Performed for planning of biopsy or surgical treatment
 - Osteomyelitis, suspected, as indicated by **ALL** the following:
 - Osteomyelitis, suspected, as indicated by **1 or more** of the following:
 - Bone pain (localized) associated with chills or fever
 - Cellulitis that responds poorly to antibiotics
 - Focal lesion seen on bone scan
 - Plain x-ray findings suspicious for osteomyelitis (
 - Sinus tract infection from ulcer, suspected
 - Need for CT scan, as indicated by **1 or more** of the following:
 - Bone sequestration, suspected
 - Gas in bone, suspected
 - Localization of metallic and nonmetallic foreign body
 - MRI contraindicated or not available, or results indeterminate
 - Postoperative assessment needed due to high clinical suspicion of localized infection (e.g., fever, leukocytosis, elevated erythrocyte sedimentation rate)

- Pain localized to neck or radicular in nature, subacute or chronic, as indicated by **ALL** the following
 - Failure to improve after 6 or more weeks of nonoperative treatment, as indicated by **1 or more** of the following:
 - Activity modification
 - Exercise
 - Pharmacotherapy (e.g., analgesics, anti-inflammatory medications)
 - Physical therapy
- Patient being considered for invasive treatment (e.g., epidural steroids, surgery)
- Significant interference with daily function
- MRI contraindicated or not available
 - Postoperative evaluation of cervical spine, as indicated by **1 or more** of the following
 - Dynamic x-ray findings inconclusive for presence of spinal motion suggestive of nonunion (pseudarthrosis)
- Evaluation of correct positioning of metal implants (e.g., pedicle screws)
- Multilevel fusion
 - Spinal cord compression or stenosis of cervical spine, suspected, as indicated by **ALL** the following
 - : Progressive or disabling signs or symptoms, as indicated by **1 or more** of the following:
 - Hyperactive reflexes
 - Muscle weakness
 - Sensory loss in cervical dermatome distribution
 - Spasticity
- Patient being considered for operative treatment
- Cervical MRI or CT myelogram contraindicated or not available, or results indeterminate Spondylotic myelopathy, suspected, as indicated by **ALL** the following
- : Signs or symptoms of myelopathy, as indicated by **1 or more** of the following:
 - Babinski signs positive
 - Fecal incontinence
 - Gait abnormality (e.g., spastic or ataxic)
 - Hoffman sign positive (i.e., thumb flexion and adduction upon flexion of long finger terminal phalanx)
 - Hyperreflexia or clonus
 - Motor weakness of upper or lower extremity (e.g., bilateral or involving multiple nerve roots)
 - Sensory or motor deficits, significant or progressive
 - Spasticity
 - Urinary urgency, frequency, retention, or overflow incontinence
- MRI contraindicated or not available
- Stereotactic spine radiotherapy treatment planning
- Subluxation or odontoid erosion, suspected (e.g., from rheumatoid arthritis), and negative findings on plain x-rays Torticollis, as indicated by **1 or more** of the following
- : Nontraumatic etiology in child younger than 18 years
- Posttraumatic etiology, when plain-film x-ray results unremarkable or inconclusive
 - Trauma or fracture of cervical spine, known or suspected, as indicated by **1 or more** of the following
 - : Cervical spine clearance after trauma

- Pathology at cervicothoracic junction, suspected (shoulder bones may obscure C7-T1 traumatic injuries on plain x-rays)
- Pediatric patient
- Preoperative planning for mechanically unstable spine
- Trauma involving hyperextension in patient with underlying spinal disease, as indicated by **1 or more** of the following (:
 - Ankylosing spondylitis
 - Degenerative spondyloarthropathy
 - Diffuse idiopathic skeletal hyperostosis
 - Rheumatoid arthritis
 - Repeat evaluation of specific area or structure with same imaging modality, and **ALL** of the following:
- Clinical need for repeat imaging, as indicated by **1 or more** of the following:
 - Change in clinical status (eg, worsening symptoms or new associated symptoms), and findings may impact treatment
 - Need for interval reassessment that may impact treatment plan
 - Need for re-imaging either prior to or after performance of invasive procedure
- Prior imaging results of specific area or structure with same imaging modality documented and available for comparison

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- **Myelogram Followed by CT**

- Indicated only if magnetic resonance imaging and plain CT are inadequate to define bone, soft tissue, and nerve anatomy

- **Bone Scan**

- Indicated for ANY ONE of the following:
 - Suspected spondyloarthropathies, e.g., ankylosing spondylitis
 - Suspected skeletal metastases due to the presence of ALL the following:
 - Known malignancy
 - Neck pain
 - No neuromotor deficits
 - Initial plain x-ray

RECOMMENDED RECORDS

Please submit history and physical or progress notes that show the symptoms, exam findings, and any pertinent diagnostic tests that may have been done. (i.e. X-ray, ultrasound).

CITATION

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CLINICAL PROTOCOL REVISION HISTORY

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Approved By:	Michelle Tom, MD, Senior Medical Director of Operations	Date: 2/6/2026	Signature Signed by: <i>Michelle Tom</i> 640C0721-A1BF-46E1-85EA-0A60233305D5...
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