

## PROTOCOL OVERVIEW

This Clinical Protocol advises on indications and guidelines for Thoracic Spine MRI.

## INDICATIONS

### Clinical Indications for Procedure

- a. Thoracic spine MRI may be indicated for **1 or more** of the following:
  - i. Evidence of cord compression or myelopathy, as indicated by **1 or more** of the following:
    1. Urinary urgency, frequency, retention, or overflow incontinence
    2. Spasticity
    3. Fecal incontinence
    4. Significant or progressive sensory or motor deficit
    5. Hyperreflexia or clonus
    6. Positive Babinski sign
  - ii. Suspected spinal injury, as indicated by **1 or more** of the following:
    1. Results of plain x-ray or CT nondiagnostic or show abnormal spine motion
    2. Suspicion of **1 or more** of the following:
      - a. Ligamentous injury
      - b. Epidural hematoma
      - c. Traumatic disk herniations
    3. Neurologic symptoms associated with types of trauma, as indicated by **1 or more** of the following:
      - a. Fall from height greater than 10 feet (3.1 meters)
      - b. High-speed motor vehicle accident (greater than 60 miles per hour (80.5 km per hour))
      - c. Motor vehicle accident with acute hyperflexion of spine over seat belt
      - d. Ejection from motorcycle
      - e. Minimal trauma in osteoporotic patient with suspected fragility fracture
  - iii. Cancer or clinical suspicion of neoplasm (benign or malignant), primary or metastatic, as indicated by **1 or more** of the following:
    1. Back pain in patient with personal history or concurrent diagnosis of malignancy (e.g., malignancy of breast, lung, or prostate)
    2. Localized thoracic back pain and **1 or more** of the following:
      - a. Unexplained weight loss
      - b. Pain occurring mainly at night
      - c. Rapidly progressing weakness
      - d. Positive bone scan
      - e. History of malignancy
      - f. Persistent pain in patient older than 50 years
      - g. Post-treatment monitoring

- iv. Clinical suspicion of spinal infection (e.g., vertebral osteomyelitis, disk space infection, epidural abscess), as indicated by **ALL** of the following:
  - 1. Localized midline thoracic back pain
  - 2. Localized thoracic back pain and **1 or more** of the following:
    - a. Fever or positive blood culture
    - b. Elevated erythrocyte sedimentation rate
    - c. Recent history of spinal surgery
    - d. Immunosuppression
    - e. History of intravenous drug abuse, other source of infection, or recent invasive procedure
    - f. Positive bone scan or suggestive x=ray
    - g. Concurrent or suspected diagnosis of tuberculosis
- v. Clinical suspicion of inflammatory or demyelinating process (e.g., clinically isolated syndrome, multiple sclerosis, other demyelinating disease), as indicated by **1 or more** of the following:
  - 1. Findings of suspected transverse myelitis (idiopathic or in conjunction with multiple sclerosis) in thoracic spinal cord
  - 2. Known or suspected multiple sclerosis and **1 or more** of the following:
    - a. Signs or symptoms of myelopathy
    - b. Ascending numbness or tingling (e.g., from foot to trunk)
    - c. Brown-Sequard syndrome
    - d. Brain MRI nondiagnostic for multiple sclerosis
    - e. Rheumatic diseases with demyelination mimicking multiple sclerosis (e.g., Sjogren syndrome, systemic lupus erythematosus, and antiphospholipid syndrome) have not been ruled out.
- vi. Findings of suspected tethered cord, as indicated by **1 or more** of the following:
  - 1. Cutaneous manifestations of occult spina bifida (e.g., nevus, lipomas, tufts of hair, hemangiomas, dimple overlying spine)
  - 2. Urinary dribbling or lack of bladder control
  - 3. Abnormal urodynamic tests
  - 4. Gait abnormality or difficulty
- vii. Spinal curvature or scoliosis, as indicated by **1 or more** of the following:
  - 1. Abnormal neurologic findings on clinical examination
  - 2. Surgical planning for idiopathic scoliosis with risk factors for neural axis malformation, as indicated by **1 or more** of the following:
    - a. Age at first visit 10 years or younger
    - b. Male gender
    - c. Thoracic kyphosis 30 degrees or greater
    - d. Kyphosis at curve apex
    - e. Left-sided thoracic curvature
    - f. Short segment curve (i.e., less than 6 vertebral segments)
    - g. Moderate to severe pain
  - 3. Infantile or early juvenile onset before age 5 years
  - 4. Neurofibromatosis
  - 5. Congenital scoliosis
- viii. Reassessment of suspected postoperative spinal complications, as indicated by **1 or more** of the following:
  - 1. Postoperative hemorrhage or hematoma
  - 2. Spondylodiscitis
  - 3. Pseudo meningocele
  - 4. Sterile arachnoiditis
  - 5. Significant new pain syndrome or neurologic findings

- ix. Clinical suspicion of spinal dysraphism, as indicated by **1 or more** of the following:
  1. For infants: decreased spontaneous leg movement, absent reflexes, leg atrophy, foot asymmetry, decreased urinary stream
  2. For toddlers: developmental delay in walking, abnormal gait
  3. For older children: spasticity, hyperreflexia, bowel or bladder disturbance, including incontinence
- x. Other suspected congenital spinal conditions, as indicated by **1 or more** of the following:
  1. Myelomeningocele
  2. Myelocele
  3. Diastematomyelia (i.e., split cord malformation)
  4. Dorsal dermal sinus
  5. Intradural lipoma
  6. Hydromyelia
  7. Split notochord syndrome
  8. Syringomyelia
  9. Spinal stenosis
- xi. Pain localized to thoracic back unresponsive to 6 weeks of nonoperative treatment including analgesics and NSAID's, exercise, modification of activity and physical therapy.

## DISCUSSION

- Thoracic spine MRI is indicated for evidence of thoracic spinal cord compression, trauma, neoplasm, or infection.
- For suspicion of metastatic disease to the spine in patients with known primary malignancy, whole-spine MRI is considered first-line imaging because multiple sites of spinal cord compression are seen in up to 1/3 of patients with metastatic epidural spinal cord compression. MRI is useful for staging neoplastic meningitis for palliative radiotherapy.
- Thoracic MRI is a first-line option for suspected thoracic spinal infection and inflammation, including spondylitis, epidural abscess, osteomyelitis, and spinal tuberculosis.
- For clinical suspicion of a demyelinating disease such as multiple sclerosis in patients presenting with a clinically isolated syndrome, most commonly manifested as unilateral optic neuritis, brainstem syndrome, or partial myelitis, diagnostic criteria have been developed based on the demonstration of CNS lesions disseminated in space and disseminated in time on MRI imaging of the brain and, if appropriate, on spinal cord imaging. Spinal cord involvement is common with multiple sclerosis, and lesions may be present solely in the spinal cord in up to 25% of patients, with lesions in the cervical spine occurring more commonly than in the thoracic spine. An expert consensus panel recommends spinal cord imaging for patients with suspected demyelinating disease who present with signs or symptoms of spinal cord involvement or if the number of lesions on brain MRI is insufficient to meet established criteria for multiple sclerosis.
- For scoliosis, a review concluded that MRI is not routinely indicated for pain in the absence of abnormal neurologic examination findings or an atypical curve, such as a left-sided curve (levoscoliosis), a short segment or kyphosis near the curve apex. In a prospective study of 250 scoliosis patients undergoing surgery, factors predicting neural axis deformity associated with scoliosis included age at first visit less than 11 years, left-sided thoracic curvature, thoracic kyphosis greater than 30 degrees, neurologic deficit (highest association with sustained clonus or asymmetric loss of superficial abdominal reflex), and presence of moderate or severe back pain.

## CITATION

Milliman Care Guidelines, "Ambulatory Care", "Thoracic Spine MRI", 23<sup>rd</sup> Edition, 2/26/2019