

MRI Thoracic Spine

CPT: 72146, 72147, 72157

IMPORTANT NOTES

Red Flags Disregard any requirement for prior management if any of the following are part of the clinical history:

- Abnormal CBC, Sed Rate, etc.
- Bladder and Bowel dysfunction
- Fever
- Cancer, History of
- Immunocompromised state
- IV drug use
- Major weakness of a limb
- Pain increased at rest
- Saddle anesthesia
- Trauma
- Unexplained weight loss
- Urinary tract infections

The requirement for Medical or Conservative Management prior to imaging is satisfied if the following are met:

1. Nonsteroidal anti-inflammatory drugs for at least four weeks (Requirement is waived if NSAIDS are not tolerated or contraindicated, or if condition worsens while under treatment.)
2. Activity modification or physical therapy if appropriate

1 Major Symptom or Complaint presented as primary indication

1.1 Bilateral radiculopathy

1.1.1 Failed Conservative Management No RED FLAGS and ONE

1.1.1.1 Atrophy of extremity musculature

1.1.1.2 Burning sensations (dysesthesias)

1.1.1.3 Hyporeflexia

1.1.1.4 Numbness, in nerve root distribution

1.1.1.5 Shooting pain, in nerve root distribution

1.1.1.6 Tingling sensations (paresthesias),

1.1.1.7 Weakness, in nerve root distribution

1.2 Bladder dysfunction

1.3 Bowel incontinence

1.4 Burning sensations (dysesthesias)

1.4.1 Failed conservative management

1.5 Clumsiness, increasing with time

1.6 Erectile dysfunction

NOTE:

"Imaging studies are rarely performed, except in situations in which pelvic trauma or surgery has occurred." * Nonetheless, if the requirements for CAUDA EQUINA SYNDROME are met MRI may be authorized.

1.6.2 Cauda Equina Syndrome Either

1.6.2.1 Complaints, ANY, Conservative Management REQUIRED

1.6.2.1.1 Leg weakness

1.6.2.1.2 Low-back pain

1.6.2.1.3 Sciatica

1.6.2.2 Findings, ANY, these are RED FLAGS, Conservative Management NOT REQUIRED

1.6.2.2.1 Bowel and bladder dysfunction

1.6.2.2.2 Decreased rectal tone and perineal reflexes

1.6.2.2.3 Saddle anesthesia

References:

1. 1. Stanley A Brosman, MD, Erectile Dysfunction: Differential Diagnoses & Workup eMedicine Specialties > Urology > Erectile Dysfunction, Premature Ejaculation, and Sexual Disorders Updated: Jan 15, 2008 Accessed Jan 2, 2009
2. Harwood, P. J., Grotz, M., Eardley, I., Giannoudis, P. V. Erectile dysfunction after fracture of the pelvis J Bone Joint Surg Br 2005 87-B: 281-290
3. Levin, Kerry; Lumbar Spinal Stenosis, UpToDate 15.2 accessed 07/09/07
4. Tintinalli's Emergency Medicine A Comprehensive Study Guide, 6th Edition Judith E. Tintinalli, MD, MS, Gabor D. Kelen, MD, J. Stephan Stapczynski, MD, O. John Ma, MD and David M. Cline, MD Eds. The American College of Emergency Physicians Section 22: Trauma > Chapter 256. Spinal Cord Injuries > Clinical Features > Spinal Cord Lesions >•
5. Gait disturbances
6. Loss of bowel or bladder control

1.9 Numbness, in nerve root distribution

1.9.1 Failed conservative management

1.10 Pain, in back

1.10.1 Failed conservative management

1.10.2 Known malignancy elsewhere RED FLAG

1.11 Pain, local to spine or radiating in root pattern

1.11.1 No RED FLAGS, Failed conservative management

1.11.2 Suspected epidural abscess

1.11.2.1 AIDS

1.11.2.2 ESR elevated

1.11.2.3 Fever

1.11.2.4 Immunosuppressed

1.11.2.5 White count elevated

1.12 Paralysis

1.13 Sensory abnormality confirmed by examination

1.13.1 Radiculopathy or disc disease suspected. Failed conservative management

1.14 Severe pain, not responding to opiates or worsening, RED FLAG

1.15 Shooting pain, in nerve root distribution

1.15.1 Radiculopathy or disc disease suspected. Failed conservative management

1.16 Tingling sensations (paresthesias)

1.16.1 Radiculopathy or disc disease suspected. Failed conservative management

1.17 Weakness, in nerve root distribution

1.17.1 Failed Conservative Management

2 Working Diagnosis or Rule Out presented as primary indication

2.1 Bilateral radiculopathy

2.1.1 Atrophy of extremity musculature

2.1.2 Burning sensations (dysesthesias)

2.1.3 Hyporeflexia

2.1.4 Numbness, in nerve root distribution

2.1.5 Shooting pain, in nerve root distribution

2.1.6 Tingling sensations (paresthesias)

2.1.7 Weakness, in nerve root distribution

2.2 Brachial Plexus Pathology (Plexopathy) MRI with contrast preferred.

2.2.1 Note MRI C Spine strongly preferred, refer for physician review

2.2.1.1 Plexopathy refers to an abnormality of the complex of nerve roots exiting the spine and organizing into the nerves serving the arm, trunk or legs. Symptoms may include burning, tingling, or numbness in a circumferential or dermatomal distribution. The symptoms may radiate to the hand or remain localized in the neck.

2.2.2 Indications BOTH

2.2.2.1 History

2.2.2.1.1 Breast or lung cancer

2.2.2.1.1.1 Aliya Qayyum, A. David MacVicar, Anwar R. Padhani, Patrick Revell, and Janet E. S. Husband Symptomatic Brachial Plexopathy following Treatment for Breast Cancer: Utility of MR Imaging with Surface-Coil Techniques Radiology March 2000 214:837-842

2.2.2.1.2 History of radiation therapy to the chest, breast or axilla

2.2.2.1.2.1 Bowen, BC, Verma, A, Brandon, AH, Fiedler, JA Radiation-induced brachial plexopathy: MR and clinical findings AJNR Am J Neuroradiol 1996 17: 1932-1936

2.2.2.1.3 Palpable mass in neck or shoulder area

2.2.2.2 Symptoms of upper extremity

2.2.2.2.1 Numbness

2.2.2.2.2 Paresthesias

2.2.2.2.3 Radiating pain

2.2.2.2.4 Weakness

References:

1. ACR Appropriateness Criteria Plexopathy p10 Accessed 12/28/08
2. Aliya Qayyum, A. David MacVicar, Anwar R. Padhani, Patrick Revell, and Janet E. S. Husband Symptomatic Brachial Plexopathy following Treatment for Breast Cancer: Utility of MR Imaging with Surface-Coil Techniques Radiology 2000 214: 837-842.
3. BC Bowen, A Verma, AH Brandon, and JA Fiedler Radiation-induced brachial plexopathy: MR and clinical findings AJNR Am. J. Neuroradiol., Nov 1996; 17: 1932 – 1936. Neurosurgical Focus Posted 04/02/2007 Accessed 1/4/09 @ http://www.medscape.com/viewarticle/553963_1
4. Bowen B, Seidenwurm DJ, Davis P, et al, Expert Panel on Neurologic Imaging, American College of Radiology, Appropriateness Criteria, Plexopathy, accessed at http://www.acr.org/SecondaryMainMenuCategories/quality_safety/app_criteria/pdf/ExpertPanelonNeurologicImaging/PlexopathyDoc12.asp 12/28/08
5. Devin K. Binder, M.D., Ph.D.; Justin S. Smith, M.D., Ph.D.; Nicholas M. Barbaro, M.D Primary Brachial Plexus Tumors: Imaging, Surgical, and Pathological Findings in 25 Patients Neurosurgical Focus Medscape Radiology accessed 12/28/08
6. Edward Fathers, David Thrush, Susan M Huson, and Andrew Norman Radiation-induced brachial plexopathy in women treated for carcinoma of the breast Clinical Rehabilitation, Feb 2002; 16: 160 – 165.
7. Neoplastic Brachial Plexopathy Author: Mark A Wren, MD, MPH, Medical Director, Department of Physical Medicine and Rehabilitation, HealthSouth Rehabilitation Hospital of Texarkana eMedicine Specialties > Physical Medicine and Rehabilitation > Plexopathy Updated: Jan 19, 2010 Accesed 3/15/10
8. Vincent J. Miele, M.D.; John A. Norwig, A.T.C.; Julian E. Bailes, M.D. Sideline and Ringside Evaluation for Brain and Spinal Injuries

2.3 Cauda Equina Syndrome Either

2.3.1 Complaints, ANY, Conservative Management REQUIRED

2.3.1.1 Leg weakness

2.3.1.2 Low-back pain

2.3.1.3 Sciatica

2.3.2 Findings, ANY, these are RED FLAGS, Conservative Management NOT REQUIRED

2.3.2.1 Bowel and bladder dysfunction

2.3.2.2 Decreased rectal tone and perineal reflexes

2.3.2.3 Saddle anesthesia

2.3.2.4 Known Malignancy and

2.3.2.4.1 Leg weakness

2.3.2.4.2 Low-back pain

2.3.2.4.3 Sciatica

References:

1. Carlos A. Bagley, M.D., Ziya L. Gokaslan, M.D., Cauda Equina Syndrome Caused by Primary and Metastatic Neoplasms Posted 07/02/2004 Neurosurg Focus 16(6), 2004. © 2004 American Association of Neurological Surgeons
2. Levin, Kerry; Lumbar Spinal Stenosis, UpToDate 15.2 accessed 07/09/07
3. Tintinalli's Emergency Medicine A Comprehensive Study Guide, 6th Edition Judith E. Tintinalli, MD, MS, Gabor D. Kelen, MD, J. Stephan Stapczynski, MD, O. John Ma, MD and David M. Cline, MD Eds. The American College of Emergency Physicians Section 22: Trauma > Chapter 256. Spinal Cord Injuries > Clinical Features > Spinal Cord Lesions >
4. Cauda equina syndrome Chris Lavy, Andrew James, James Wilson-MacDonald, Jeremy Fairbank
5. BMJ 2009;338:b936, doi: 10.1136/bmj.b936 (Published 31 March 2009)

2.4 Fracture suspected x-ray not diagnostic

2.4.1 Localized pain

- History of trauma or repeated minor injury (stress fracture suspected)

2.5 Epidural abscess, Suspected BOTH

2.5.1 Clinical Findings ONE

2.5.1.1 AIDS

2.5.1.2 ESR Elevated

2.5.1.3 Fever

2.5.1.4 Immunosuppressed

2.5.1.5 Infection elsewhere

2.5.1.6 Positive blood culture

2.5.1.7 Recent spinal surgery or procedure

2.5.1.8 WBC elevated

2.5.2 Symptoms ONE

2.5.2.1 Loss of bowel or bladder control

2.5.2.2 Muscle weakness

2.5.2.3 Pain, local to spine or radiating in root pattern

2.5.2.4 Paralysis

2.5.2.5 Sensory abnormality confirmed by examination

2.5.2.6 Tenderness over spine

2.6 LumboSacral Plexus Pathology (Plexopathy)

2.6.1 History of Breast or Lung cancer

2.6.2 History of radiation therapy to the lumbosacral spine

2.6.3 Incontinence

2.6.4 Numbness

2.6.5 Paresthesias

2.6.6 Radiating pain

2.6.7 Weakness of lower extremity

2.6.8 References

References:

1. Devin K. Binder, M.D., Ph.D.; Justin S. Smith, M.D., Ph.D.; Nicholas M. Barbaro, M.D Primary Brachial Plexus Tumors: Imaging, Surgical, and Pathological Findings in 25 Patients Neurosurgical Focus Medscape Radiology accessed 12/28/08
2. Bowen B, Seidenwurm DJ, Davis P, et al, Expert Panel on Neurologic Imaging, American College of Radiology, Appropriateness Criteria, Plexopathy, accessed at http://www.acr.org/SecondaryMainMenuCategories/quality_safety/app_criteria/pdf/ExpertPanelonNeurologicImaging/PlexopathyDoc12.asp 12/28/08
3. ACR Appropriateness Criteria Plexopathy p10 Accessed 12/28/08
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5. Dahele M, Davey P, Reingold S, et al. Radiation-induced lumbo-sacral plexopathy (RILSP): an important enigma. Clin Oncol (R Coll Radiol). Jun 2006;18(5):427-8.

2.7 Fracture suspected x-ray not diagnostic

2.7.1 Localized pain

2.7.2 History of trauma or repeated minor injury (stress fracture suspected)

2.8 Myelopathy Suspected MRI PREFERRED Lumbar myelopathy is evaluated by performing a Thoracic spine exam because the spinal cord ends at the approximate level of T12 or L1.

2.8.1 Bilateral radiculopathy

2.8.1.1 Failed Conservative Management No RED FLAGS and ONE

2.8.1.1.1 Atrophy of upper extremity musculature

2.8.1.1.2 Burning sensations (dysesthesias)

2.8.1.1.3 Hyporeflexia

2.8.1.1.4 Numbness, in nerve root distribution

2.8.1.1.5 Shooting pain, in nerve root distribution

2.8.1.1.6 Tingling sensations (paresthesias),

2.8.1.1.7 Weakness, in nerve root distribution

2.8.2 Bladder dysfunction

2.8.3 Bowel incontinence

2.8.4 Clumsiness, increasing with time

2.8.5 Gait disturbances

2.8.6 Sensory abnormality objectively observed

2.9 Neurogenic Claudication SEE Radiculopathy

2.10 Osteomyelitis suspected

2.10.1 Pain or Fever AND One

2.10.1.1 C reactive Protein elevated

2.10.1.2 Elevated ESR

2.10.1.3 Fever

2.10.1.4 Leukocytosis

2.10.1.5 Positive Blood Cultures

References:

1. Parsonnet Jeffrey, "Chapter 120. Osteomyelitis" (Chapter). Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, Loscalzo J: Harrison's Principles of Internal Medicine, 17th Edition: <http://www.accessmedicine.com/content.aspx?aID=2893649>.
2. Alok Kapoor, Stephanie Page, Michael LaValley, Daniel R. Gale, and David T. Felson Magnetic Resonance Imaging for Diagnosing Foot Osteomyelitis: A Meta-analysis Arch Intern Med, Jan 2007; 167: 125 – 132.
3. J. Herman Kan, Melissa A. Hilmes, Jeffrey E. Martus, Chang Yu, and Marta Hernanz-Schulman Value of MRI After Recent Diagnostic or Surgical Intervention in Children with Suspected Osteomyelitis Am. J. Roentgenol., Nov 2008; 191: 1595 – 1600.
4. Kuo-Chen Lee, Yi-Ting Tsai, Chih-Yuan Lin, and Chien-Sung Tsai Vertebral osteomyelitis combined streptococcal viridans endocarditis Eur. J. Cardiothorac. Surg., Jan 2003; 23: 125.
5. D Allen, S Ng, K Beaton, and D Taussig Sternal osteomyelitis caused by Aspergillus fumigatus in a patient with previously treated Hodgkin's disease J. Clin. Pathol., Aug 2002; 55: 616 – 618.
6. M Ida, H Watanabe, A Tetsumura, and T Kurabayashi CT findings as a significant predictive factor for the curability of mandibular osteomyelitis: multivariate analysis Dentomaxillofac. Radiol., Mar 2005; 34: 86 – 90.
7. Jyri K. Koort, Tatu J. Mäkinen, Juhani Knuuti, Jari Jalava, and Hannu T. Aro Comparative 18F-FDG PET of Experimental Staphylococcus aureus Osteomyelitis and Normal Bone Healing J. Nucl. Med., Aug 2004; 45: 1406 – 1411.
8. Susan A. Connolly, Leonard P. Connolly, Laura A. Drubach, David Zurakowski, and Diego Jaramillo MRI for Detection of Abscess in Acute Osteomyelitis of the Pelvis in Children Am. J. Roentgenol., Oct 2007; 189: 867 – 872.

2.11 Radiculopathy or Spinal Stenosis

2.11.1 Failed Conservative Management NO Red Flags ANY ONE

2.11.1.1 Atrophy of musculature

2.11.1.2 Burning sensations (dysesthesias)

2.11.1.3 Numbness, in nerve root distribution

2.11.1.4 Positive Straight Leg Raising (SLR) test

2.11.1.5 Shooting pain, in nerve root distribution

2.11.1.6 Tingling sensations (paresthesias),

2.11.1.7 Weakness, in nerve root distribution

2.12 Scoliosis

2.12.1 Prior to corrective surgery

2.13 Spinal Stenosis SEE Radiculopathy

3 Abnormal Physical Exam Finding presented as primary indication

3.1 Hyporeflexia

3.1.1 Radiculopathy or disc disease suspected. Failed conservative management

3.2 Numbness, in nerve root distribution

3.2.1 Failed conservative management

3.3 Pain, local to spine or radiating in root pattern

3.3.1 No RED FLAGS, Failed conservative management

3.3.2 Suspected epidural abscess

3.3.2.1 AIDS

3.3.2.2 ESR elevated

3.3.2.3 Fever

3.3.2.4 Immunosuppressed

3.3.2.5 White count elevated

3.4 Sensory abnormality confirmed by examination

3.4.1 Radiculopathy or disc disease suspected. Failed conservative management

3.5 Straight Leg Raising test positive, conservative management failed

3.6 Weakness, in nerve root distribution OR dermatome

3.6.1 Failed Conservative Management

4 Abnormal Lab or Imaging presented as primary indication

4.1 Fracture seen or suspected on recent x-ray

4.2 Menigocele or Myelomeningocele (Known from prior examination)

5 Significant Prior Medical History presented as primary indication

5.1 Epidural abscess, Known

5.1.1 After treatment

5.1.1.1 Interval Follow up

5.1.1.2 Recurrent or worsening symptoms

5.2 Infection or abscess, after treatment

5.3 Management and assessment of spinal injury.

5.4 Menigocele or Myelomeningocele (Known from prior examination)

5.5 Metastasis Suspected, Known malignancy elsewhere

5.5.1 Focal Pain

5.5.2 Neurologic findings

5.5.3 Suspicious findings on other imaging

5.6 Multiple Sclerosis (KNOWN)

5.6.1 Symptoms or Signs attributable to the Thoracic Spine

- REFERENCES: Adams and Victor's Neurology > Part 4. Major Categories of Neurologic Disease > Chapter 36. Multiple Sclerosis and Allied Demyelinative Diseases > Multiple Sclerosis > Pathologic Findings

5.7 Osteomyelitis Known

5.7.1 Interval follow up during and after treatment

5.7.2 Preoperative

5.7.3 Worsening clinical situation

References:

1. Parsonnet Jeffrey, "Chapter 120. Osteomyelitis" (Chapter). Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, Loscalzo J: Harrison's Principles of Internal Medicine, 17th Edition: <http://www.accessmedicine.com/content.aspx?aID=2893649>.
2. Alok Kapoor, Stephanie Page, Michael LaValley, Daniel R. Gale, and David T. Felson Magnetic Resonance Imaging for Diagnosing Foot Osteomyelitis: A Meta-analysis Arch Intern Med, Jan 2007; 167: 125 – 132.
3. J. Herman Kan, Melissa A. Hilmes, Jeffrey E. Martus, Chang Yu, and Marta Hernanz-Schulman Value of MRI After Recent Diagnostic or Surgical Intervention in Children with Suspected Osteomyelitis Am. J. Roentgenol., Nov 2008; 191: 1595 – 1600.
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7. Jyri K. Koort, Tatu J. Mäkinen, Juhani Knuuti, Jari Jalava, and Hannu T. Aro Comparative 18F-FDG PET of Experimental Staphylococcus aureus Osteomyelitis and Normal Bone Healing J. Nucl. Med., Aug 2004; 45: 1406 – 1411.
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5.8 Trauma

5.8.1 Abnormal or nondiagnostic prior x-ray

5.8.2 Cauda Equina Syndrome after injury ANY

5.8.2.1 Bowel and bladder dysfunction

5.8.2.2 Decreased rectal tone and perineal reflexes

5.8.2.3 Leg weakness

5.8.2.4 Low-back pain

5.8.2.5 Saddle anesthesia

5.8.2.6 Sciatica

5.8.2.7 Weakness, in nerve root distribution

5.8.2.7.1 Radiculopathy or disc disease suspected. Failed conservative management

5.8.3 Menigocele or Myelomeningocele

5.8.3.1 Myelomeningocele is protrusion of nerve roots or cord elements along with the meninges. It occurs at least ten times more often than simple menigocele and always causes some degree of neurologic deficit.

5.8.3.2 Menigocele consists of herniation of the meninges through a spina bifida without abnormality of the spinal cord or nerve roots. Neurologic function is usually preserved in these patients.

References:

1. Gerard M. Doherty and Lawrence W. Way CURRENT Surgical Diagnosis & Treatment, 12th Edition Chapter 37. Neurosurgery & Surgery of the Pituitary Mitchel S. Berger, MD Copyright © 2006 by The McGraw-Hill Companies, Inc. Accessed via Access Medicine 1/05/09
2. Midline spinal tenderness
3. New onset of neurologic findings

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1. A Gardner, S Grannum and KM Porter Cervical spine trauma Trauma [London] 2005; 7: 109-121
2. American College of Surgeons Committee on Trauma. 1997. Advanced trauma life support for doctors.
3. British Trauma Society. 2002. Guidelines for initial management and assessment of spinal injury. Injury, Int J Care Injured 34: 405-25.
4. Principles of Critical Care, 3rd Edition Copyright © 2005, 1998, 1992 by The McGraw-Hill Companies Jesse B. Hall, Gregory A. Schmidt, Lawrence D.H. Wood Part X. The Surgical Patient; Chapter 94. Spine Injuries; G. E. Johnson