Axioms in Thoracic Spine Assessment

The thoracic spine requires evaluation in isolation and together with the cervical and lumbar spine.

Axioms in Thoracic Spine Assessment

- Thoracic pain can be perplexing and difficult to diagnose
- The most commonly involved area is the thoracolumbar junction

Diagnostic Keys

1. Identify postural strain syndromes
2. Identify radicular syndromes
3. Always check for myelopathy

Diagnostic Keys

Identify postural strain syndromes

This is an example of postural imbalance due to pelvic obliquity
Can you name another very common postural strain condition?

Diagnostic Keys

Identify radicular symptoms

- This pain distribution indicates cervical radiculopathy
- Differentiate cervical and thoracic pain generators
Diagnostic Keys

Spinal tumor
- Always check for myelopathy

Most Common Causes of Thoracic Pain
- Intervertebral joint sprain
- What would be your diagnosis of this condition?

Most Common Causes of Thoracic Pain
- Disk disease or injury
- What is your diagnosis?

Most Common Causes of Thoracic Pain
- Zygapophyseal joints
- What would be your diagnosis?

Vertebral Subluxation
Posterior or Anterior Joint Dysfunction
The subluxation is defined as a motion segment in which alignment, movement integrity, and/or physiological function of the spine are altered although contact between joint surfaces remains intact. ACA

Subluxation and Medicare
- Under the policies developed by the Centers for Medicare and Medicaid Services (CMS), coverage of chiropractic services is specifically limited to manual manipulation of the spine to correct a subluxation.
Subluxation and Medicare

- Unless this subluxation is properly documented, medical necessity has not been established and claims may be rejected by Medicare.

Utilization guidelines for chiropractic services require the following three components in order to establish medical necessity.

Subluxation and Medicare Utilization Guidelines

1. Presence of a subluxation that causes a significant neuromusculoskeletal condition.
2. Documentation of the subluxation
3. Documentation of the initial and subsequent visits


Medicare & Vertebral Subluxation

- Pain and tenderness
- Asymmetry or misalignment
- Range of motion abnormality
- Tissue tone changes

Vertebral Subluxation

- What is your diagnosis?

Most Common Causes of Thoracic Pain

- Paraspinal muscle strain
- If the strain traumatized the lower trapezius and the iliocostalis musculature, what is your diagnosis?
Most Common Causes of Thoracic Pain

- Costovertebral joint sprain
- Which specialized orthopedic tests would identify and confirm the diagnosis?

Strain/Sprain Differential Diagnosis

- Palpable tenderness over intervertebral joint
- Supraspinous ligament tenderness

Strain/Sprain Differential Diagnosis

- Pain on twisting, cervical flexion, or extreme extension
- O’Donoghue’s

Strain/Sprain Differential Diagnosis

- Paraspinal myospasm or hypertonicity

Strain/Sprain Differential Diagnosis

- Radiological findings are usually unremarkable

Scheplemann’s Test Intercostal Pain

1. Contralateral pain might indicate pleurisy or intercostal strain
2. Ipsilateral pain might indicate intercostal neuropathy or costovertebral sprain
Soto-Hall Test
Osseous, ligament or discal pathology
- Non-specific test
- Localized pain indicates a positive test
- Differentiate strain, sprain, fracture, and SOL (space-occupying lesion)

Intercostal Syndrome
Differential Diagnosis
1. Intercostal neuralgia or neuritis
2. Pleurisy
3. Fractured rib
4. Intercostal myofascitis

Most Common Causes of Thoracic Pain
- Scheurmann’s disease (adolescents)
- Intercostal neuralgia or neuritis
- Fractured rib
- Intercostal myofascitis

Most Common Causes of Thoracic Pain
- At what age would you anticipate a patient presenting with Scheurmann’s disease?

Scheurmann’s Disease
- A form of Osteochondrosis
- Vascular impairment and trauma coupled with a genetic predisposition.

Scheurmann’s Disease
Three Stages
1. Avascular necrosis (vascular impairment)
2. Acute inflammation in areas of necrosis
3. Healing and repair

Extracted from THE UNIVERSITY OF TEXAS MEDICAL BRANCH AT GALVESTON
Scheurmann’s Disease

- Affects mostly teenage boys
- Inflammation in thoracic intervertebral joints
- Leads to excessive kyphosis.

Extracted from THE UNIVERSITY OF TEXAS MEDICAL BRANCH AT GALVESTON

Scheurmann’s Disease

Differentiation from Round Back

- Spinal postural alterations do not resolve with recumbent position
- Confirmed with radiographic exam
- Sleeps with 2-3 pillows propped under back

Extracted from THE UNIVERSITY OF TEXAS MEDICAL BRANCH AT GALVESTON

Scheurmann’s Disease

Treatment: Maintain mobility

1. Modalities for pain and inflammation.
2. Exercises to maintain present thoracic kyphosis; avoid worsening, i.e. thoracic extension exercises.
3. Thoracic extension orthotic

Extracted from THE UNIVERSITY OF TEXAS MEDICAL BRANCH AT GALVESTON

Kyphotic Scoliosis

Treatment

- Prevent additional deformity
- Reduce pain

Less Common Causes of Thoracic Pain

- Fracture of the rib posteriorly
- Please identify the fracture site...

Chance Fracture

- Horizontal fracture thru vertebra (body, pedicles, laminae)
- Sudden deceleration with lap-only seatbelt usually L1 or L2

Extracted from THE UNIVERSITY OF TEXAS MEDICAL BRANCH AT GALVESTON
Sternal Compression Test
- Compresses lateral borders of ribs
- Fracture becomes more pronounced
- Produces or exacerbates fractured rib pain

Less Common Causes of Thoracic Pain
- Thoracic disk prolapse

Less Common Causes of Thoracic Pain
- T 4 syndrome
  - Have you ever heard of this syndrome?

T4 Syndrome
**CLINICAL FEATURES**
- Upper thoracic joint dysfunction, T4 segment, appeared to be the major cause of the upper extremity symptoms and headaches.

T4 Syndrome
**CLINICAL FEATURES**
- Non-traumatic onset
- Peculiar glove-like distribution of hand or forearm pain
- Can often lead to a mistaken diagnosis, including psychogenesis

**CLINICAL FEATURES**
- Paresthesias,
- Numbness, or upper extremity pains associated with or without headaches and upper back stiffness characterize the T4 syndrome.
- No hard neurological signs are present.

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**T4 Syndrome**

**Treatment**
- Joint manipulation
- Stretching
- Strengthening exercises directed at the upper thoracic dysfunctional segments

PMID: 7706958

**CONCLUSION**
- Upper extremity symptoms of nocturnal or early morning paresthesias, especially in a glove-like distribution

PMID: 7706958

**T4 Syndrome**

**CONCLUSION**
- Coupled with headaches and a stiff upper thoracic spine without neurological signs of disease may indicate a T4 syndrome.

PMID: 7706958

**T1 and/or T2 Nerve Root Neuropraxia**

**Clinical Signs**
- Thoracic pain
- Anterior abdominal pain
- Loss of abdominal sensation

**T-1 & T-2 Nerve Root Lesions**
- Scapular area pain with passive approximation of the scapulae
- Indicates T1 or T2 nerve root compression or irritation
Splenius Cervicis Syndrome

- Thoracic pain due to cervical and thoracic muscle and joint dysfunction
- C2-3 and T4-5 relationship
- Extends and rotates cervical spine (Maigne 1964)

What type of injury might cause a patient to seek your professional services for splenius cervicis syndrome?

Thoracic Diseases

1. Strain, sprain, and/or fracture
2. Intercostal syndrome
3. Fibrositis
4. Myelopathy
5. Tuberculosis
6. Intervertebral disc syndrome
7. Ankylosing spondylitis
8. Scoliosis

Strain, Sprain, and Fracture Discussion

- O’Donoghue’s
- Percussion
- Palpation
- Radiographic examination
- Range of motion

Intercostal Syndrome Discussion

- Palpation
- Schepelmann’s
- Percussion
- Soto-Hall
- Radiographic examination
Fibrositis and Fibromyalgia
- Most commonly employed to designate pain and tenderness of connective tissue, particularly around joints and in or near muscles and tendons, for which a cause is not evident.

Myelopathy and Thoracic Disc Herniation
- May cause permanent cord damage
- May result in paraplegia with weakness and numbness in the legs and complete loss of bowel, bladder, and sexual function
- May present a great variety of symptoms

Myelopathy and Thoracic Disc Herniation
Lower thoracic spine
1. Flaccid neurologic loss and mimics lumbar spine disease
2. Neurogenic claudication or sciatica

Myelopathy and Thoracic Disc Herniation
Upper thoracic spine
1. Spastic neurologic loss
2. T1-2 or T2-3 may present as a cervical problem with pain radiating to the medial aspect of the arm, hand, and shoulder, with possible intrinsic hand weakness and/or Horner’s syndrome

Myelopathy and Thoracic Disc Herniation
Beevor’s Sign
When Beevor’s sign is present, T 7-12 spinal levels must be evaluated

Pathognomonic
- A sign or symptom that is so characteristic of a disease that it makes the diagnosis.
- The word "pathognomonic" (pronounced patho-no-mon-ic) comes from the Greek "pathognomonikos" meaning "skilled in judging diseases."
Tuberculosis of the Spine  
“Pott’s Disease”

- Increased incidence with Central American immigrants.
- Epidemic in certain parts of the United States

Pott’s Disease

- Results from haematogenous spread of tuberculosis from other sites, often pulmonary.
- The infection then spreads from two adjacent vertebrae into the adjoining disc space.

Thoracic Intervertebral Disc Syndrome

- “Probably the most important diagnosis to make in thoracic and thoracic-radiating pain is that of a thoracic disc herniation.”  
  
  Evans

Thoracic Intervertebral Disc Syndrome

- Incidence is rare and seen in less than 0.03% of the population
- 50% of thoracic disc herniations present significant spinal cord injury

Thoracic IVD Syndrome

- The use of computed tomography in combination with myelography and magnetic resonance imaging have greatly increased the ability to accurately visualize thoracic spine disorders.

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Thoracic IVD Syndrome Treatment

- How would you treat?
Ankylosing Spondylitis

- Relatively rare condition in which the spine ossifies (lays down bone).
- Affects young males
- Initially produces pain in the sacroiliac joints.

- Spine becomes more rigid
- Multiple small stress fractures may develop.
- Gravity promotes a flexed forward posture.

Mensuration of chest expansion

- Normal expansion is 2" for males and 1" for females
- A decrease in normal expansion indicates restriction of movement at costotransverse or costovertebral joints

Treatment

- Myofascial treatments
- Gentle spinal manipulations
- Intersegmental traction
- Relief of the thoracic stiffness and pain.

Classification of Scoliosis

Structural or Nonstructural

1. Structural curves are fixed, nonflexible, and fail to correct with side bending.
2. Nonstructural curves are not fixed but flexible and readily correct with side bending.
Thoracic Scoliosis
Origin of a lateral curvature of the spine

1. Idiopathic (85-90%)
2. Congenital (Usually failure of formation)
3. Neuromuscular

Congenital Scoliosis
- Hemivertebra
- Wedge-shaped or half vertebra
- Occurs in utero at 4-6 weeks of gestation

Spina Bifida Occulta
Congenital Anomaly
- Severe congenital anomalies of the spine and brain normally present a high incidence of mortality

Neuromuscular Scoliosis
- Cerebral palsy
- Polio
- Spinal muscular dystrophy
- Post-spinal cord injury

Postural Kyphosis
- Thoracolumbar kyphosis due to postural deficit is caused by poor postural habits
- Most prevalent in adolescents
- Patient presents “Round back”

Postural Strain Due to Disproportionately large breasts
- Chronic cervical and thoracic Pain
- No relief with treatment
- Significant negative impact
Chronic Neck and Back Pain
Disproportionately large breasts
- Chronic upper back, neck and shoulder pain
- Poor posture
- Skin rash under the breasts
- Deep grooves in the shoulders from bra strap pressure

Reduction Mammaplasty
- Restricted levels of activity
- Self-esteem problems
- Difficulty wearing or fitting into certain bras and clothing

Reduction Mammaplasty
Prerequisite Behavior
- Weight reduction
- Exercise program
- Smoking cessation
- Chiropractic rehab

Signs of Scoliosis
- How would you differentiate scoliosis from pelvic obliquity and postural imbalance?

Scoliosis Examination
- Adam’s position
- Dorso-lumbar ROM
- Radiographic examination with 14x36 full spine studies

Sciatic Scoliosis Vanzetti’s Sign
- Sciatica
- Level pelvis
- Scoliosis
Thoracic vs. Lumbar Scoliosis

Radiographic Examination
- Initial study should be followed in six months
- Annual follow-up
- Evaluate progress of curves
- Cobb angles

Cobb’s Angle
- Measure angles formed by inferior and superior vertebral lines

Thoracic Outlet Syndrome
- Traumatic TOS may be caused by traumatic or repetitive activities such as a motor vehicle accident or hyperextension injury (for example, after a person overextends an arm during exercise or while reaching for an object). NINDS

Thoracic Outlet Syndrome Sensory distribution
- Pain is the most common symptom of this TOS, and often occurs with tenderness. Paresthesias (an abnormal burning or prickling sensation generally felt in the hands, arms, legs, or feet), sensory loss, and weakness also occur. NINDS

Thoracic Outlet Syndrome Cervical Rib
- True neurologic TOS is the only type with a clear definition that most scientists agree upon. The disorder is rare and is caused by congenital anomalies (unusual anatomic features present at birth). NINDS
Thoracic Outlet Syndrome

- It generally occurs in middle-aged women and almost always on one side of the body. Symptoms include weakness and wasting of hand muscles, and numbness in the hand. NINDS

Venous Thoracic Outlet Syndrome

- Neurogenic 80%
- Venous 15%
- Arterial 5%
- Female 75%

Thoracic Outlet Syndrome

Roos Test

- Abduct shoulders and externally rotate to 90° with elbow flexion at 90°.
- Open and close hands for 5 minutes.

Roos Test

- Reproduction of symptoms or a sensation of heaviness or fatigue is considered a positive test result (Safran, 2004).

Thoracic Outlet Syndrome

Wright’s Test

- Hyperabduct and externally rotate the patient’s arm while assessing the ipsilateral radial pulse.
- Considered positive if the pulse diminishes or paresthesias develop (Safran, 2004).

Organic Diseases that Refer Pain to Thoracic Spine

- Cardiac causes
- Peptic ulcer
- Tumor (e.g. carcinoma of the breast or METS)
Serious Thoracic Disorders

Myocardial infarct
- Crushing pain radiating to the jaw or arm suggests acute ischemia or MI.
- Patients often ascribe myocardial ischemic pain to indigestion.
- Exertional pain relieved by rest indicates angina pectoris

Aortic aneurysm
- Tearing pain radiating to the back suggests thoracic aortic dissection.

GERD
- Burning pain radiating from epigastrium to throat, exacerbated by lying down and relieved by antacids, suggests GERD.

Pneumonia
- Fever, chills, and cough suggest pneumonia.
- Significant dyspnea suggests pulmonary embolism or pneumonia.
- Might progress to pleurisy

End of Thoracic Spine Presentation