Knowledge enhances awareness and improves the potential for accurate diagnosis…

Key to Success

“Diagnosis is the key to successful treatment!”

You are the chiropractic physician of the future…

Mastering the diagnosis and treatment of these neuromusculoskeletal conditions will determine your success in school, clinic, and throughout your career…

Lumbar Spine Back Pain

Back pain is common from the second decade on.

Low Back Pain Male Gender Prevalence

1. Spondyloarthopathies
2. Vertebral osteomyelitis
3. Benign and malignant neoplasms
4. Paget’s disease
Low Back Pain

Male Gender Prevalence

5. Retroperitoneal fibrosis
6. Peptic ulcer disease
7. Work-related mechanical disorders

Female Gender Prevalence in Low Back Pain

1. Polymyalgia rheumatica
2. Fibromyalgia
3. Osteoporosis
4. Parathyroid disease

Lumbar Spine Pain Generators

- Zygapophyseal joint
- Capsule
- Nerve
- Ligament
- Muscle
- Osseous

Characteristics of Lumbar Spine Pain

- Spinal pain
- Discogenic pain
- Nerve root pain
- Multiple levels of lumbar spinal stenosis

The Dermatomal Rule “Referred pain”

- Brain often "refers" pain from a viscus to the related somatic dermatomal area.

Characteristics of Low Back Pain Viscero-somatic Convergence

- Brain cannot distinguish between nociceptive activity originating in the viscus and that originating in the somatic structure due to convergence.
Differential Diagnosis
Low Back Pain Examples
- Dehydration
- Nephrolithiasis
- Gout
- Renal Carcinoma
- Metastasis

Characteristics of Low Back Pain
Viscero-somatic Convergence
- Dehydration
- Gout
- Murphy test & kidney punch (Peri-nephritic abscess)
  - Dr. John Benjamin Murphy (surgeon)

Mechanical Low Back Pain
Spinal Motion Segment
- As many as 90% of patients with back pain have a mechanical reason for their pain secondary to overuse or trauma

Mechanical Low Back Pain
Overuse
- Strain
- Myospasia
- Dehydration
- Discopathy

Mechanical Low Back Pain
A normal anatomic structure
- Pain secondary to trauma
- Deformity of an anatomic structure.

Mechanical Low Back Pain
Post-Traumatic Pain
- Lumbar strain
- Lumbar sprain
- Lumbar fracture
- Lumbar strain/sprain
Mechanical Low Back Pain

Deformities of anatomic structures

- Abnormal spine
  1. Wedged vertebra
  2. Hemivertebra
  3. Congenital bar
  4. Block vertebra

Congenital Scoliosis

- Rib hump
- Deviation of spinous process
- Vertebral distortion
- Posterior convexity
- Anterior concavity

Would you consider this condition as a structural or non-structural scoliosis?

Differential Diagnosis of Lumbar Pain

1. Disc injuries
2. Mechanical joint dysfunction
3. Myofascial conditions
4. Ligamentous conditions
5. Neural conditions

Mensuration of Lumbar Flexion

- 80 degrees of lumbar flexion is WNL
- Movement must occur at lumbar spine and not the hips or thoracic spine

Schober’s Test

- Mark lumbosacral junction, 10 cm superior, and 5 cm inferior
- Have patient flex forward and measure the differences
Mensuration of Lumbar Flexion
Schober’s Test

- Normal findings would indicate 4 cm of increase with superior pair of marks and zero change with inferior pair of marks.

Lumbar Range of Motion
Flexion and Extension

- Flexion 80 degrees
- Extension 35 degrees

Lumbar Range of Motion
Lateral Flexion

- Lateral Flexion 25 degrees

Coupling of lumbar spine is the opposite of the cervical and thoracic spine
- Lumbar spinous processes move toward concavity with lateral flexion

Clinical Picture

- What type of range of motion changes would you expect with mechanical low back pain due to posterior joint dysfunction?
**Lumbar Spine**

**Intervertebral Disc Disease**
- Intervertebral disc disease and disc herniation are most prominent in the third and fourth decades of life.

**Radiculopathy**
- Low back pain that extends into thigh and leg
- Radicular pain often extends below the knee in the affected dermatome.

**Back and posterior thigh pain arises from many areas of the spine**
- Facet joints
- Longitudinal ligaments
- Periosteum of the vertebrae.

**Lumbar Radicular Syndrome**
- Aging and trauma are believed to be the causes of discopathy

**Lumbar Radicular Syndrome**
- At what ages would you suspect the most common exacerbation of severe discogenic radicular pain?

**Lumbar Radicular Syndrome Disc Anatomy**
- Attaches vertebral bodies
- Provides flexibility
- Absorbs and distributes Spinal column loads
**Evolution of Disc Function**
- Equal distribution
- Unequal distribution
- Dysfunction and disc herniation

**Posture and Disc Loading**
- Explains exacerbations and remissions of pain with change in posture.

**Specialized Imaging & Lumbar Disc Disease**
- Why utilize MRI examinations when we suspect lumbar disc disease?

**Specialized Imaging & Lumbar Disc Disease**
- Protruding herniated nucleus pulposus
- Thecal sac indentation
- Decreased hydration of disc

**Clinical Picture**
- Please describe the peripheral nerve findings that might present with this lumbar disc disease.

**Lumbar Radicular Syndromes Lumbar Disc Herniation**
- Nerve root involvement
- Pain referral patterns
- Sensory & Motor deficits
- DTR’s compromised
Clinical Picture

- What type of range of motion changes would you expect with lumbar herniated nucleus pulposus (HNP) pain?
- Why?

Clinical Picture

- Please describe what type of specialized tests might be indicated with this lumbar disc disease.

Valsalva’s Maneuver

**Neuro-orthopedic application**

- Assessment for space-occupying lesion, tumor, intervertebral disc herniation, or osteophytes

Lindner’s Sign

**Assessment for Lumbar Nerve Root Irritation**

- Passive flexion of neck with chin to chest
- Supine, seated, or standing position

Lindner’s Test

- Sign is present if procedure produces pain in lumbar spine & sciatic distribution

Kemp’s Test

- May be performed in either a standing or sitting position
- A positive test involves radicular pain
Kemp’s Test Assessment

- Intervertebral nerve root encroachment
- Muscular strain
- Ligamentous sprain
- Pericapsular inflammation

Kemp’s Test

- Oblique bending toward symptomatic side increases pain with a lateral protrusion

Kemp’s Test

- Oblique bending away from symptomatic side increases pain with a medial protrusion

Straight-Leg-Raising Test Dynamics

1. 0-35 degrees = no dural movement
2. 35-70 degrees = tension of sciatic nerve over intervertebral disc
3. Above 70 degrees presents very little additional deformation of nerve root

Straight Leg Raise Test

Nerve Root Tension Pain Reaction

- 0-35 = extradural
- 35-70 = disc lesion
- 70-90 = lumbosacral lesion

SLR

- Dull pain in posterior thigh may be due to tight hamstrings
- Bowstring test differentiates
Straight-Leg-Raising Test

- Bilateral SLR testing
- Simultaneously perform Well-Leg-Raising test

Well-Leg-Raising Test

- SLR of unaffected LE
- Contralateral LE radicular pain is positive test for nerve root lesion

Well-Leg-Raising

SLR of unaffected limb presents

- Decreased pain with lateral protrusion due to pulling away of the nerve root from the protrusion

Bragard’s Sign

1. Perform SLR
2. Lower affected LE 5 degrees
3. Dorsiflex the ipsilateral foot
Bragard’s Sign
- Assessment for sciatic neuropraxia, intervertebral disc lesions, and spinal nerve irritation

Fajersztajn’s Test
- Assessment for lumbar nerve root lesion caused by IVD syndrome or dural sleeve adhesion
- Contralateral LE SLR
- Perform Bragard’s

Sicard’s Test
Assessment for Sciatic Radiculopathy
- SLR
  - Lower affected LE 5 degrees
  - Dorsiflex large toe
  - Positive test with radicular pain

Turyn’s Test
Assessment for Sciatic Radiculopathy
- Supine position
  - Dorsiflexion of large toe without SLR
  - Positive test with radicular pain

Minor’s Sign
- Painful or antalgic behavior due to protective myospasia
  - Crawling up thigh with listing

Minor’s Sign
- List will vary with medial vs. lateral discopathy
Clinical Picture

- If a patient presented with leg pain below the knee, a level pelvis, and scoliosis, would you suspect discopathy?
- Why?

Vanzetti's Sign

- In sciatica the pelvis is always horizontal in spite of scoliosis, but in other lesions with scoliosis the pelvis is inclined. (pelvic obliquity)

Antalgic Lean Sign

“Antalgia Sign”

- Painful discopathy causes listing in order to reduce mechanical nerve root pain.

Antalgia Sign

- Medial protrusion presents with antalgic list to the painful side of lesion
- Lateral protrusion presents with antalgic list opposite the side of painful lesion
- Central disc lesion presents with flexed antalgic list

Differentiate Lateral Disc from Medial Disc Protrusion

- Antalgic lean
- Well Leg Test
- Kemp’s test
**Evolution of Discopathy**

- Disc Protrusion is present when nuclear material does not extend beyond the annulus in a contained HNP.

**Disc Injuries**

- Disc Protrusion

**Sequestered or Fragmented Disc**

- A free fragment that has broken off or through the annular peripheral fibers in the vertebral canal (prolapsed)

**Disc Extrusion**

- A focal herniation contained by the posterior longitudinal ligament that extends into the spinal canal

**Lumbar Disc Degeneration**

- Disc degeneration may occur and remain asymptomatic
Lumbar Discopathy

- At what age would you expect the most serious disc lesions that usually require surgical intervention?
- Why?

MRI

- Disc degeneration may be associated with changes within the disc itself, which may produce pain

Degenerative Disc Degeneration

- Mechanical Instability

May give rise to mechanical instability that renders the spine vulnerable to trauma

Lumbar Discopathy

- Once you make the diagnosis of lumbar discopathy, what is your next clinical step?

Consultation with Patient Discopathy

- It is essential that you first make an accurate diagnosis of discopathy and then discuss the diagnosis and treatment with the patient prior to manipulation...

Lumbar Spondylosis

- Osseous and Discal Involvement

- Degenerative changes in discs and joints
- Bony overgrowths or spur formations, which are osteophytes
Osteophytes

- Osteophytes located predominantly at the anterior, lateral, and, less commonly, posterior aspects of the superior and inferior margins of vertebral bodies.

Lumbar Spondylosis

- Lumbar Osteophytosis
- Osteochondrosis
- Degenerative Joint Disease
- Vertebral Osteophytosis

Causes of Lumbar Spondylosis

1. “Sprung back” hyperflexion injury
2. “Kissing spines” hyperextension injury
3. Capsular and ligamentous sprain injuries “Facet joint degeneration” or “zygapophyseal joint imbrication”

Mechanical Joint Dysfunction

Documentation of the Subluxation: The P.A.R.T. System

- The P.A.R.T. documentation system for Medicare has been a topic of much concern and discussion among chiropractors. Recall that the subluxation may be documented by one of two methods: x-ray or physical examination, and that if the latter is used, it must be documented according to the P.A.R.T. system. The four components of P.A.R.T. are described below. CMS requires that at least two of the four components must be documented, and at least one of A or R.
- http://www.acatoday.com/content_css.cfm?CID=1217#Initial
Vertebral Subluxation Complex

Textbook of Clinical Chiropractic: A biomechanical approach

- Positional dyskinesia (sprain/strain) Examples: Retrolisthesis or Anterolisthesis
- Fixation dysfunction
  Examples: Meniscoids, myospasia, adhesions, & inflammation
- Compensatory hypermobility and instability
- Disc protrusions

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Lumbar Facet Syndrome

Low Back Pain Symptoms

- Constant dull ache
- Intermittent sharp pain
- Catch with certain movement
- Increased pain with standing and extension

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Lumbar Facet Syndrome Innervation

- Medial branch of the primary dorsal rami

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Lumbar Facet Syndrome

What specialized orthopedic tests would you perform to evaluate a low back pain patient with this syndrome?

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Lumbar Facet Syndrome

Palpation may reveal PVM hypertonicity and pain
Lumbar Facet Syndrome

- Flexion should be WNL
- Extension should be reduced with localized pain

Lumbar Facet Syndrome

- Extension and rotation increase pain
- Flexion reduces pain
- Kemp’s produces localized pain

Lumbar Facet Syndrome

- Degenerative joint changes at zygapophyseal joints

Farfan

Lumbar Facet Syndrome

- Degeneration of cartilage
- Meniscoid entrapment

Facet Joint Injection and Spinal Manipulation

- Reduces pain and edema prior to spinal manipulation

Lumbar Facet Joint Imbrication

- Zygapophyseal joint imbrication with capsular degeneration
Spondylolysis with Spondylolisthesis

- Separation at pars interarticularis
- Anterior slippage of superior vertebral body on inferior body

Meyerding’s Classification of Spondylolisthesis

- Grade 1 = 0-25%
- Grade 2 = 26-50%
- Grade 3 = 51-75%
- Grade 4 = 76%-100%

Anterolisthesis or Spondylolisthesis

1. Degenerative (L4-L5 level)
2. Spondylolysis or Isthmic spondylolisthesis (L5-S1)
3. Congenital caused by inadequate development of the L5-S1 facet complexes

Lumbar Central Canal Stenosis

Structural Causes

1. Osseous: inferior facet arthrosis
2. Discogenic: central disc herniation
3. Ligamentous: ligamentum flavum buckling in degenerative spinal disease

Lumbar Central Canal Stenosis

- Neurogenic claudication with pain upon walking
- Feel like legs are “giving way”
- Temperature changes and weakness in legs
- Night pain
- Sciatic tension signs are present

Lateral Spinal Canal Recess Stenosis

- Degenerative joint disease
- Encroachment of nerve root in canal
- Nerve root entrapment
**Lateral Spinal Canal Recess Stenosis**

**Neurogenic Pain**
- Intermittent episodes of pain in the hips, buttocks, or posterior thigh
- Pain referred to foot or toes
- Sensory deficits in calf are common

**IVD or Space Occupying Lesion**

**Milgram’s Test**

**Assessment for IVD or Space-Occupying Lesion**
- Patient able to hold for 30 seconds
- Rules out intrathecal pathology

**Positive Milgram’s Test**
- Indicates intrathecal or extrathecal pathology
- The test is positive if the patient experiences low back pain

**Intrathecal Pathology**
- Intrathecal pathology may involve a spinal tumor.

**Extrathecal Pathology**
- Extrathecal pathology may involve a herniated disc or space occupying lesion
Neurofibromatosis

- A complicated genetic disease that can affect both men and women in all races and ethnic groups.
- 1/4000 births U.S.

Neurofibromatosis von Recklinghausen’s Disease

- Tumors grow on and along various types of nerves.
- The disease can also affect non-nervous tissues like bones and skin and lead to developmental abnormalities such as learning disorders.

Neurofibromatosis

- “Café au lait” skin markings
- Neurofibromas
- Skeletal deformities (scoliosis)

Neurofibroma

- Tumor or growth located along a nerve or nervous tissue.
- Inherited disorder
- May cause neural deficits

Neurofibromatosis

- “Café au Lait”

Neurofibromatosis Lumbar Skin Markings

- “Café au Lait”

Neurofibromatosis

- Faun’s beard
Neurofibromatosis

- Neurofibromas