Clinical Summary

• Objectives:
  – Back pain work up in a cost effective way
  – Which tests to order and when to order them
  – Differential diagnosis
  – Role of different interventions
Outline

– **Sciatica and differential diagnosis**

– Ankylosing spondylitis and axial spondyloarthritis

– Lumbar canal stenosis
SCIATIC NERVE

• The largest nerve in the body

• Most common areas of involvement are L4–L5 and L5–S1 levels

• 40% of Sciatica occurs at the 4th and 5th decade of life
Symptoms and Examination Findings

Depends on the dermatome involved:

- **L4**: difficulty in squatting and rising
  - knee jerk diminished
- **L5**: difficulty walking on heels
- **S1**: difficulty walking on toes.
  - ankle jerk diminished
SCIATICA/DISC HERNIATION

• Pain that radiates from the buttock downward along the course of the sciatic nerve

• Neuroradiology studies affirm that 85% of cases of sciatica are associated with a disk disorder
SPONDYLOLISTHESIS

- Often associated with spondylolysis
- Most common at L5-S1 junction
- Causes low back pain later in the day
- Often associated with fracture of pars interarticularis
FORAMINAL STENOSIS

• Associated with paracentral disc prolapse

• Involves the spinal nerve below the vertebral level

• Seen in association with age related spinal hypertrophic and degenerative changes
SYNOVIAL CYST

- Presents similar to sciatica symptoms, but is usually **more chronic and progressive**
- Involves the exiting nerve root
- Diagnosed by MRI spine
PIRIFORMIS SYNDROME

- Compression of the sciatic nerve underlying the piriformis muscle
- Focal mid-buttock pain, tenderness over the sciatic notch
- Aggravation of pain after sitting
- Provocation with external rotation of the hip

- Treatment of the piriformis syndrome involves stretching and physical therapy to enhance mobility
INJECTION SITE TRAUMA

• Possible to injure the sciatic nerve by deep injection in gluteal muscle

• Uncommon
GYNECOLOGIC AND PERIPARTUM CAUSES OF SCIATICA LIKE SYMPTOMS

• Caused by
  – Nerve compression between the fetal head and the pelvic brim
  – Large ovarian cysts and uterine enlargement
  – Endometriosis: endometrial tissue deposits on the proximal nerve

• Pain can be recurrent, cyclic

• Occurs after prolonged time in the lithotomy position
OTHER CAUSES OF SCIATICA LIKE SYMPTOMS

• **Zoster Sine Herpete**
  – Few days before the eruption of shingles
  – Often involves lumbar or upper sacral dermatome

• **Traumatic Injury of the Sciatic Nerve**
  – Fractures of the pelvis
  – Proximal hamstring or nerve injury
  – Muscle hematomas or tendinous injuries
  – Posterior hip dislocation
  – Femoral fracture
IMAGING

• Imaging is not necessary in a typical case
• Radiographs may show
  – Reduction in the height of intervertebral space
  – Spondylolisthesis
  – Osteomyelitis
  – Tumor infiltration
• Imaging should be considered **only** if intervention is planned
• MRI helps diagnose
  – Location of disk rupture
  – Lateral recess stenosis
  – Synovial cysts
  – Facet joint problems
ELECTROPHYSIOLOGICAL TESTING

• Test if diagnosis is questionable
• Radiculopathy confirmed by testing yields better surgical outcome
• Sampling four or five relevant muscles including the paraspinal regions is considered adequate
• Role of EMG in sciatica has not been established
CONSERVATIVE TREATMENT

- Sciatica resolves without treatment in the majority of cases
- Initial treatment is pain control by medication and physical therapy
- Many guidelines recommend restrictions on the use of opioids
- Indicated interventions
  - temporarily reduce pain
  - increase participation in exercises
PHYSICAL THERAPY

Motor-control exercises that focus on:

– control of the transversus abdominis
– multifidus muscles (deep back muscles)
– strengthening of other core muscles
– stretching and exercise, improving posture
– slowly increasing mobilization
NONPHARMACOLOGICAL TREATMENTS

• **Spinal manipulation** for sciatica is widely used
• Spinal manipulation provides short-term benefits when added to an exercise program
• Lumbar traction showed no benefits
• Transcutaneous electrical nerve stimulation is unclear
EPIDURAL INJECTIONS

• Short-term decrease in leg pain but no decrease in the need for subsequent surgery
SURGICAL TREATMENT OF SCIATICA CAUSED BY LUMBAR DISC DISEASE

• 33% improve in 2 weeks without treatment
• 75% improve in 3 months
• Trials favor surgery when comparing surgical to conservative treatment of sciatica due to lumbar disk disease
• Results in earlier relief of pain
• There were few differences in pain or disability between the two groups 1 year post-surgery
INDICATIONS FOR SURGERY

• Review showed
  – Conflicting evidence of long-term benefit
  – Greater and more rapid pain relief with surgery compared to conservative treatment

• Large disc ruptures that compress the cauda equina with bowel bladder involvement
COST-EFFECTIVENESS

- Prolonged conservative care versus early surgery correlated with a cost savings per quality-adjusted life-year of approximately $60,000
- 23% of the participants reverted from recovered to not recovered suggesting sciatica can be a chronic with relapsing symptom
SURGICAL TECHNIQUES

• Unilateral procedure preserves tension and alignment between adjacent spinal segments
• Fusion of adjacent spinal segments is generally not necessary
• Overall outcomes of minimally invasive or conventional treatment are similar
• Minimally invasive approaches
  – Earlier and better pain relief
  – Less para-spinal muscle damage
  – Longer operating times and are associated with a higher rate of re-rupture of disc
• Surgery complications
  – Dural tears and CSF leaks
  – Root damage
NORTH AMERICAN SPINE SOCIETY

• Only surgery benefitted all aspects of global effect, pain relief, and a composite of condition-specific outcomes in the short, medium, and long term.

• That discectomy provides more effective and more rapid symptom relief than do other treatments for symptoms that warrant surgery.

• Less severe symptoms can be managed conservatively.

• Patients with psychological distress have poor outcomes after surgery.
Epidural glucocorticoid injection provides short-term pain relief

Electrodiagnostic studies have limited utility

Lumbar fusion: insufficient evidence for comment

There is inadequate evidence to gauge how long one can wait before surgery and still recover from cauda equina compression or motor deficits
BRITISH PAIN SOCIETY

• Any indication of cauda equina compression requires referral for urgent surgery

• MRI is indicated for
  – Severe radicular pain that is disabling or intrusive or that prevents the patient from performing everyday tasks
  – A persistent neurologic deficit that lasts 2 weeks
Outline

– Sciatica and differential diagnosis

– *Ankylosing spondylitis and axial spondyloarthritis*

– Lumbar canal stenosis
ANKYLOSING SPONDYLYTISIS AND AXIAL SPONDYLOARTHritis

• Ankylosing spondylitis, an inflammatory disorder, leads to the bony fusion of vertebral joints
• Uncommon but well-established cause of chronic back pain
• Prevalence of axial spondyloarthritis in the United States is 0.9 to 1.4% of the adult population
• Similar to rheumatoid arthritis prevalence
• Prolonged delay in reaching the diagnosis
CLASSIFICATION OF SPONDYLOARTHITIS

• Axial spondyloarthritis
  – With radiographic sacroiliitis
  – Without radiographic sacroiliitis
  – Sacroiliitis on MRI
  – HLA-B27 positivity plus clinical criteria

• Peripheral spondyloarthritis
  – With psoriasis
  – With inflammatory bowel disease (Crohn’s disease or ulcerative colitis)
  – With preceding infection
  – Without psoriasis or inflammatory bowel disease or preceding infection
CHARACTERISTICS OF INFLAMMATORY BACK PAIN

- Age at onset <45 yr
- Duration >3 mo
- Insidious onset
- Morning stiffness >30 min
- Improvement with exercise
- No improvement with rest
- Awaking from pain, especially during second half of night, with improvement on arising
- Alternating buttock pain
- Two or more suspicion for inflammatory back pain
- Four or more features can be considered diagnostic
- The sensitivity of inflammatory back pain for the diagnosis of axial spondyloarthritis is 70 to 80%
MEASURES OF DISEASE ACTIVITY AND OUTCOME

• Ankylosing Spondylitis Disease Activity Score (ASDAS)

• Score is calculated
  – Basis of patient ratings with regard to spinal pain
  – The duration of morning stiffness
  – Overall global assessment
  – Peripheral arthritis
  – Laboratory assessments of either the C-reactive protein level or the erythrocyte sedimentation rate

• (www.asas-group.org/clinical-instruments/asdas_calculator/asdas.html)
RISK FACTORS

• The strongest predictor is the presence of syndesmophytes at baseline
• History of smoking and elevated levels of inflammatory markers at baseline
• Involvement of one or often both hip joints occurs in 24 to 36% of patients
• Hip replacement indicated in 8% of patients
ASSOCIATED CLINICAL MANIFESTATIONS

• Half of patients with ankylosing spondylitis have arthritis in peripheral joints or peripheral entheses at some point in the disease course
• Acute anterior uveitis has a lifetime prevalence of 30 to 40%
• Psoriasis occurs in more than 10%
• Inflammatory bowel disease is seen in 5 to 10% of patients
• Osteoporosis of the spine and peripheral bones
• Spinal fracture rate is as high as 10%
ROLE OF HLA-B27

- HLA-B27 is found in 74 to 89% of patients with ankylosing spondylitis.
- The absolute risk of spondyloarthritis in persons with HLA-B27 positivity is 2 to 10%.
- Higher if a first-degree relative is affected.
TREATMENT

• Treatment goals for axial spondyloarthritis include reducing symptoms, improving and maintaining spinal flexibility and normal posture

• Reducing functional limitations, maintaining the ability to work

• NSAIDs, including selective inhibitors of cyclooxygenase 2
TREATMENT

• TNF inhibitors used for symptoms that are not controlled by NSAID
• Five TNF inhibitors — infliximab, etanercept, adalimumab, golimumab, and certolizumab have produced rapid, profound, and sustained improvement in 60% of patients
• Predictors of a good response:
  – Young age, short disease duration, a high baseline level of inflammatory markers, and a low baseline level of functional disability
• Etanercept is less effective in treating anterior uveitis and inflammatory bowel disease
CONTRAINDICATIONS

- Active infection
- High risk of infection
- Advanced heart failure
- Lupus
- Multiple Sclerosis
- Cancer
- Patients should be tested for the presence of latent or active tuberculosis
- Carriers of the hepatitis B virus (HBV) surface antigen should be treated prophylactically
RECENT STUDIES

• Secukinumab, a monoclonal antibody to interleukin-17A shows dramatic efficacy in patients with cases of inadequate responses with TNF-alpha inhibitors.

• Ustekinumab, an antibody to the subunit shared by interleukin-12 and interleukin-23, was efficacious.
OUTLINE

– Sciatica and differential diagnosis

– Ankylosing Spondylitis and axial spondyloarthritis

– Lumbar canal stenosis
LUMBAR SPINAL STENOSIS

• The clinical syndrome of neurogenic claudication due to lumbar spinal stenosis is a frequent source of pain in the lower back and extremities, impaired walking

• Most frequent indication for spinal surgery in patients older than 65 years of age
The most common symptom associated with lumbar spinal stenosis is neurogenic claudication. It radiates beyond the spinal area into the buttocks and frequently into the thigh. It is exacerbated by lumbar extension and improves with lumbar flexion.
Pathoanatomical Features of Degenerative Lumbar Spinal Stenosis
<table>
<thead>
<tr>
<th>Category</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Congenital stenosis (developmental)</td>
<td>Congenitally shortened pedicles; typical age at symptom onset, 20s–40s</td>
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<tr>
<td>Idiopathic</td>
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<tr>
<td>Achondroplastic</td>
<td>Frequently seen in achondroplastic dwarves</td>
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<td>Acquired stenosis</td>
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<td>Degenerative</td>
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<tr>
<td>Central canal</td>
<td>Disk degeneration, facet osteoarthritis, ligamentum flavum hypertrophy; typical age at symptom onset, 60s–90s</td>
</tr>
<tr>
<td>Peripheral canal, lateral recesses</td>
<td>Sciatica-like presentation in patients with lateral recess stenosis</td>
</tr>
<tr>
<td>Spondylolisthesis</td>
<td>Back pain may predominate</td>
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<tr>
<td>Combinations of congenital and degenerative stenosis</td>
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<tr>
<td>Iatrogenic</td>
<td></td>
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<tr>
<td>Postlaminectomy</td>
<td>Stenosis typically at adjacent level but may recur at operated level</td>
</tr>
<tr>
<td>Postfusion</td>
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<tr>
<td>Spondylolitic</td>
<td>Typical age of symptom onset, teens–20s, associated with spondylolisthesis</td>
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<tr>
<td>Post-traumatic</td>
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<tr>
<td>Miscellaneous</td>
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<tr>
<td>Corticosteroid excess (Cushing’s syndrome or exogenous source)</td>
<td>Goal of management is to treat underlying condition</td>
</tr>
<tr>
<td>Paget’s disease, acromegaly</td>
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The classification is adapted from Arnoldi et al.²
DIFFERENTIAL DIAGNOSIS

- Hip osteoarthritis: groin pain
- Trochanteric bursitis: pain over greater trochanter
- Peripheral neuropathy: associated paresthesia
- Vascular claudication: loss of distal pulse
IMAGING

• (MRI) or computed tomography (CT) may confirm the presence of spinal stenosis

• The sensitivities of CT and MRI for lumbar spinal stenosis exceed 70%

• It is important to recognize that more than 20% of persons older than 60 years of age who have no symptoms or functional limitations may have findings of spinal stenosis on imaging studies

• Electromyography is not routinely warranted
TREATMENT

• Majority of symptomatic patients whose care is managed nonoperatively report no substantial change over the course of 1 year

• Dramatic spontaneous improvement is also uncommon, making watchful waiting an unsatisfactory strategy for patients with intolerable symptoms
NON-OPERATIVE MANAGEMENT

• Exercises performed during lumbar flexion, such as bicycling, are typically better tolerated than walking
• Exercises that strengthen the abdominal musculature may help patients avoid pain
• Pain can typically be managed with acetaminophen and, if this fails, nonsteroidal anti-inflammatory drugs
OPERATIVE MANAGEMENT

- Decompress the central spinal canal and the neural foramina, eliminating pressure on the spinal nerve roots.
- Stenosis accompanied by spondylolisthesis: the combination of decompression and fusion is more effective.
OPERATIVE MANAGEMENT

- More than 80% of patients have some degree of symptomatic relief after surgery for spinal stenosis.
- 7 to 10 years later, at least one third of patients report back pain recurrence.
- Patients with the most severe nerve-root compression preoperatively are the most likely to benefit.
- Rates of reoperation are on the order of 10 to 23% over a period of 7 to 10 years.
- Inpatient mortality from surgery <1%.
- Deep infection risk 1%.
TAKE HOME POINTS

– Sciatica
  • Most resolve on their own
  • Surgery indicated for persistent neurological symptoms

– Ankylosing spondylitis and axial spondyloarthritis
  • Best managed by rheumatologist
  • TNF inhibitors indicated for disease activity

– Lumbar canal stenosis
  • Cause of late onset pain
  • Surgery decompression is often indicated
REFERENCES


