Back Pain
Inflammatory vs Mechanical

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Back Pain

Source: www.bodinmotion.co.uk
Back Pain

• 2nd most common patient complaint in outpatient setting

• Occupational risk factor
  – Prolonged sitting
  – Lifting
  – Bending
  – Twisting
  – Reaching

• Common cause of disability
  – Especially among nurses less than 45 years old

Source: www.bodinmotion.co.uk
Overview of the Spine

- **Vertebrae** are bones that protect your spinal cord. They can be forced or locked out of their proper positions (misaligned).

- **Ligaments and muscles** are supportive tissues that can be stretched, torn, or weakened.

- **Discs** are shock absorbers that can bulge, rupture, or wear down.

- **Nerves**, which carry the body's messages, can get stretched, pinched, or irritated.

Source: www.bodinmotion.co.uk
Bony Structures of the Vertebra

Source: www.bodinmotion.co.uk
Terminology

- **Muscle Strain**
  - Overstretched muscle
  - Pain, swelling
  - Muscle spasms, limited ability to move affected muscles

- **Disc Degeneration**
  - Mechanical low back pain
  - Aggravated by activity
  - Relieved by rest

- **Disc Herniation**
  - Nerve root irritation and compression
  - “Sciatica”, Paresthesia

- **Spinal Stenosis**
  - Narrowing of the spinal canal
  - Pressure on spinal cord
  - Pain, numbness or weakness

- **Spondylolisthesis**
  - Forward slippage of vertebra

- **Spondyloarthritis**
  - Inflammation of vertebral column

- **Osteoarthritis**
  - Breakdown of cartilage
Back Pain - Causes

• Ligamentous-muscular injury
  – Muscle Strain
• Degeneration of spine - OA
• Herniated disc
• Spinal stenosis
• Spondylolisthesis
• Fractures
• Spondyloarthritis

Source: www.bodinmotion.co.uk
Spondyloarthropathy

Classic Areas of Inflammation of Spondyloarthropathy

- Cervical spine
- Thoracic spine
- Lumbar spine
- Sacroiliac joints

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DOS Course 2015
Assessment – Back Pain

- History
- Chief complaint
- Present illness
- Past medical history
- Family history
- Occupational history
- Social history

Source: www.grandechno.com
Clinical Manifestations

- Pain
  - Onset, quality, severity, consistency, location, timing
  - Aggravating and alleviating factors

- Associated symptoms
  - Bowel or bladder problems
  - Numbness and tingling
Assessment

• Inspection
  – Observe gait
  – Curvature of spine

• Palpation
  – Spinous processes
  – Sacroiliac joint
  – Sciatic notch
  – Paraspinal musculature

• Range of Motion
  – Forward flexion
  – Toe touch
  – Lateral bends
  – Backward extension
Assessment

• Straight leg raise
  – Place patient in supine position
  – Raise leg until pain occurs
  – Dorsiflex the foot

• Radiculopathy due to lumbosacral disc herniation

• 90% are L4, L5, S1

Source: www.youtube.com
## Assessment

<table>
<thead>
<tr>
<th>Nerve root</th>
<th>L4</th>
<th>L5</th>
<th>S1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain</strong></td>
<td><img src="image" alt="Image of pain in L4" /></td>
<td><img src="image" alt="Image of pain in L5" /></td>
<td><img src="image" alt="Image of pain in S1" /></td>
</tr>
<tr>
<td><strong>Numbness</strong></td>
<td><img src="image" alt="Image of numbness in L4" /></td>
<td><img src="image" alt="Image of numbness in L5" /></td>
<td><img src="image" alt="Image of numbness in S1" /></td>
</tr>
<tr>
<td><strong>Motor weakness</strong></td>
<td>Extension of quadriceps</td>
<td>Dorsiflexion of great toe and foot</td>
<td>Plantar flexion of great toe and foot</td>
</tr>
<tr>
<td><strong>Screening examination</strong></td>
<td>Squat and rise</td>
<td>Heel walking</td>
<td>Walking on toes</td>
</tr>
<tr>
<td><strong>Reflexes</strong></td>
<td>Knee jerk diminished</td>
<td>None reliable</td>
<td>Ankle jerk diminished</td>
</tr>
</tbody>
</table>

Nordin & Anderson, 1997
Diagnosis

- H & P - < 50 years old
- X-ray to rule out
  - Malignancy
  - Compression fracture
  - Ankylosing spondylitis
  - Chronic osteomyelitis
- MRI
  - To pinpoint source of radiculopathy

Source: Google images
Mechanical Back Pain

• More frequent

• Pain that arises from an injury to a specific structure within the spine

• Intervertebral discs and facet (zygopophyseal)
  – Pain aggravated by flexion = disc pathology
  – Pain aggravated by extension = facets

Source: www.youtube.com
**Mechanical Back Pain**

- Recovery is weeks to 12 months

- Weakness of core stabilizing muscles
  - Abdominal and gluteal muscles

- 70% Reduction in recurrence of pain with strengthening of these muscles
Osteoarthritis of Spine

• Mechanical breakdown of cartilage between the aligning facet joint in the posterior (back) portion of spine

• Facet joints become inflamed and progressive joint degeneration creates more frictional pain

• Osteophytes = bone spurs
  – Small irregular growths on the bone form on the facet joints and around the spinal vertebrae
  – Osteophytes are a response to joint instability and attempt to stabilize joint
  – May become large and lead to spinal stenosis

• Affects up to 30 million Americans F > M age 50
Osteoarthritis of Spine

Healthy spine

Vertebra
Intervertebral disk

Osteoarthritic spine
Bone spur
Narrowed disk
Osteoarthritis of Spine

• Affects up to 30 million Americans F > M age 50
  – ? Genetic issue

• Lumbosacral arthritis
  – Produces stiffness and pain in the lower spine and sacroiliac joints
  – Between the spine and pelvis

• Cervical Spondylosis
  – Causes stiffness and pain in the upper spine, neck, shoulders, arms and head
Spine Osteoarthritis Diagnosis

• Diagnosis

  – Medical History
    – Aggravating, alleviating factors, radiation

  – Exam

  – Imaging
    – Xray, CT, MRI
    – Bone scan if suspected tumor, infection, fracture
    – Bone spurs are a normal aging process
      – Many people have no s/s
Management of Back Pain

• Measures to decrease inflammation
  – Analgesics – Tylenol, NSAIDS - COX-2 Inhibitors
• Muscle relaxant
• Bed rest
  – Short term 2-3 days
• Heat and cold
• Exercises
  – Aerobics
  – Abdominal strengthening
• Physical therapy
  – Reconditioning exercises
• Walking
• Acupuncture

Source: ww.whyiexercise.com
Spondyloarthritis

Spondyloarthritis: A Family of Related Diseases

- Ankylosing Spondylitis
- Undifferentiated Spondyloarthritis
- Reactive Arthritis (Reiter’s Syndrome)
- Psoriatic Arthritis
- Arthritis Associated with Inflammatory Bowel Disease (Enteropathic Arthritis)
- Juvenile Spondyloarthritis

Source: sagiapimdygiltis.org
Ankylosing Spondylitis (AS)

- Chronic inflammatory disease

- Characterized by LBP initially
  - Progressive stiffness
  - Eventual fusion (ankylosis) of vertebral column and SI joints

- Fusions results in deformities
  - Vertebral column, joints and adjacent tissues
  - Which inhibits mobility
AS Epidemiology

• M > F (new studies are showing closer gap)

• Men have more severe disease

• Age of onset 20 - 40
  – Peak @ 20

• Prevalence in United States
  – 1%         Caucasians
  – 3 - 4%     African Americans
  – 18 - 50%   Native Americans

Source: www.spondylitis.org
AS Classic Symptoms

- Onset before age 40
- Symptoms worse at night or early morning after prolonged immobilization
- Improves with exercise or activity, not relieved by rest
- Morning stiffness > 30
- Alternating buttock pain
AS Pathophysiology

- Hereditary factor: HLA-B27

- Pathologic inflammation of the entheses
  - Ligaments and tendons insert into bones of vertebrae

- End results of inflammation are scarring (fibrosis), ossification and fusion of joints

- Primarily lower vertebral column and SI joints

- Vertebral joints become fused and fibrotic
  - Loosing flexibility

- Vertebrae appear square on x-ray “bamboo spine”

- Achilles tendonitis
AS Extraskeletal Manifestations

- Occur in 25-30% of patients

- Most common is acute anterior uveitis
  - Acute pain, increased lacrimation, photophobia, blurred vision
  - Edema of eye and iris

- Rare
  - Cardiac @ 4% after 30+ years of DX
    - Ascending aoritis
    - Aortic valve incompetence
    - Cardiac abnormalities
    - Myocardial dysfunction
    - Pericarditis

Source: spondygazet.wordpress.com
AS Extraskeletal Manifestations

• Rare
  – Pulmonary involvement with progressive fibrosis of upper lobes
    – Cyst like
  – Asymptomatic mucosal inflammatory lesions in terminal ileum and colon
    – ??? Lesions play a role in pathogenesis
AS Diagnostic Studies

• Physical Exam of M/S and spine
  – Schobers Test – measures lumbosacral flexion
  – Initial c/o LBP with am stiffness
    – Difficulty with ROM
  – Kyphosis of Cervical / Thoracic / Lumbar spine
  – Decreased chest expansion due to kyphosis
  – Assessment of skin
    – History of psoriasis?

• Radiographic
  – Reveal inflammatory, fibrotic, and fused vertebral bodies (square/bamboo)
  – Colonoscopy reveals lesions in ileum

Source: www.spondylitis.be
AS Diagnostic Studies

• Serologic
  – + HLA-B27
    – 80-90% caucasians with AS
    – 8% general population
    – 50% African Americans
  – Rheumatoid Factor (-)
  – Increased ESR
  – Increased phosphatase levels
  – Anemia (- iron deficiency)

• Main diagnosis
  – Patient history
  – Physical exam
  – X-rays

Source: www.hlab27.com
Sacroiliitis

Source: Goldman: Cecil Medicine, 23rd ed
AS Treatment Options

• NSAIDS
  – Cornerstone of treatment

• DMARDs
  – Disease modifying anti-rheumatic drugs

• Corticosteroids

• Biologic DMARDs
  – TNF alpha Blockers

Source medicalnewstoday.com:
AS General Management

- Stop smoking
- OT/PT/Exercise
- Education on diagnosis
- Heat
- Local injections
- Firm Mattress (small or no pillow)
- Neck brace prn

Source: www.clker.com
Fibromyalgia
Fibromyalgia

- Disorder of unknown etiology
- Characterized by widespread pain
- Abnormal pain processing
- Sleep disturbance
- Fatigue
- Psychological distress

Fibromyalgia affects two to four percent of the population, mostly women.
Fibromyalgia Symptoms

- Morning stiffness
- Tingling or numbness in hands and feet
- Headaches
- Irritable bowel syndrome
- Sleep disturbance
- Cognitive problems “fibro fog”
- Painful menses
Fibromyalgia Causes

- Unclear
- ? Genetic component
- ? Triggering factor that initiates
Fibromyalgia Epidemiology

• Most common in women

• Middle adulthood

• Higher incidence with previous rheumatic health problems
Fibromyalgia Diagnosis - Criteria

• Pain and symptoms over the past week

• Based on the total of
  – Number of painful areas out of 18 parts of the body
  – Plus level of severity of these symptoms
    – Fatigue
    – Walking unrefreshed
    – Cognitive (memory of thought) problems

• Symptoms lasting at least three months at a similar level

• No other health problem that would explain the pain and other symptoms

Source: American College of Rheumatology Website
Fibromyalgia Diagnosis

- Symptoms
- Tender points
- No diagnostic criteria
- Rule out other potential causes
  - PMR, RA, Lupus
Fibromyalgia Treatment Options

• Medications – 3 meds FDA approved
  – Work by changing level of serotonin and norepinephrine

• Duloxetine (Cymbalta) and milnacipran (Savella)
  – Work by blocking the over activity of nerve cells involved in pain transmission

• Pregabalin (Lyrica)

• Opioid Narcotics are not recommended
  – Can make symptoms worse

• OTC: Acetaminophen (Tylenol) and NSAIDS

• Sleep aides
  – Various medications can treat sleep along with pain response
Fibromyalgia Non Medication Issues

• Make time to relax each day
  – Deep breathing exercises / meditation reduce stress

• Set a regular sleep pattern
  – Avoid daytime napping, caffeine and nicotine

• Exercise often
  – “start low, go slow”
  – Walking, swimming, stretching

• Educate patient
  – Arthritis Foundation
  – National Fibromyalgia Association

Source: www vppl.info
Fibromyalgia Summary

• Is NOT a form of arthritis

• Does NOT cause inflammation or damage to joints, muscles or other tissues

• Diagnosis of exclusion

• Medication and non medication options available

• Great resources available for patient education

• Reassurance
Upper Extremity Disorders

• Olecranon (Elbow) bursitis

• Tendonitis

• Carpal Tunnel

• Trauma

Source: training.seer.cancer.gov
Olecranon Bursitis

• Bursa

• Thin, slippery sacs located throughout the body that act as cushions between bones and soft tissues

• Contain a small amount of lubricating fluids that allows the skin to move freely over the underlying bone

• Olecranon bursa lies between the loose skin and the pointy bone at the back of the elbow called the olecranon

• Normally the olecranon bursa is flat
  — If it becomes irritated or inflamed more fluids will accumulate in the bursa and bursitis will develop
Olecranon Bursitis Causes

- **Trauma**
  - Hard blow to tip of the elbow

- **Prolonged Pressure**
  - Leaning on tip of elbow
  - Hard surfaces
  - Can take months to develop

- **Infections**
  - Break in skin
  - Redness, swelling, pain, fluid
  - Which can turn into pus

- **Arthritis**
  - Rheumatoid arthritis and gout
Olecranon Bursitis Symptoms

• Swelling
  – Can last 3-4 weeks

• Pain
  – As swelling continues, bursa begins to stretch
  – Direct pressure on elbow or bending

• Erythema
  – Infected dermis is red, warm
  – Can lead to sepsis if untreated

Source: rheumatology.org
Olecranon Bursitis Exam

• Medical History

• Assessment of elbow, arm
  – Imaging
  – X-ray to rule out foreign body or bone spur

• Arthrocentesis
  – Evaluate for infection/gout
Olecranon Bursitis Treatment

• Aspirating bursa if infection suspected

• Fluid removal helps relieve symptoms
  – If no improvement after 3 to 4 weeks can inject corticosteroid

• Antibiotics if infected

• Elbow pads

• Avoid activities that cause direct pressure to elbow

• Medications
  – NSAIDS
  – Corticosteroids
  – ICE
Olecranon Bursitis Treatment

• Surgery for infected bursa
  – No improvement with antibiotics or aspiration
  – Removal of entire bursa
  – Bursa usually grows back as a non-inflamed normal bursa after several months

• Surgery for non-infected bursa
  – If non-surgical treatments do not work
Wrist Tendonitis

• Common condition

• Characterized by irritation and inflammation of the tendons around the wrist joint

• Several tendons surround the wrist joint and attach various muscles from forearm to bones of wrist and hand

• Wrist tendonitis usually affects one of tendons but could affect 2 or more

• Often wrist tendonitis occurs at joints where the tendons cross each other or pass over bony prominence

• Wrist tendons slide through smooth sheaths as they pass by the wrist joint

• Tendon sheaths (tenosynovium) allow the tendons to glide smoothly in a low friction manner
Wrist Tendonitis

Source: www.joint-pain-solutions.com
Wrist Tendonitis Symptoms

- Pain over the area of inflammation
- Swelling of the surrounding soft-tissues
- Stiffness around wrist
- Warmth to touch
What Is The Difference Between Wrist Tendonitis And Carpal Tunnel Syndrome?

**Carpal Tunnel**
- Tightness
- Inflammation
- Nutritional deficiency
  - and -
- Numbness/Tingling

**Wrist Tendonitis**
- Tightness
- Inflammation
- Nutritional deficiency

That's It. That's The Only Difference!

Source: ww.uchospitals.edu
Wrist Tendonitis Causes

• Minute tears to tendon fibers

• Causes inflammation from
  – Overuse
  – Strain
  – Repetitive action (most common)
  – Injury
  – Nutritional deficiency
Wrist Tendonitis Risk Factors

• People who use computers for hours (mouse)
• Factory and production-line workers who have repetitive actions
• Sewing
• Sports
  – Tennis, baseball, bowling, weight lifters
• Elderly
  – Tendons have lost elasticity
  – Are more brittle

Source: www.physio.ie
Wrist Tenosynovitis Diagnosis

• Medical History
  – Contributing factors
  – Work, recreational activities

• Xrays
  – To evaluate for fractures or arthritis

• Characteristic signs of inflammation
  – Redness/warmth/tenderness
  – Finkelstein test (de Quervain’s)

• Blood tests
  – If suspicion for rheumatoid arthritis

Source: www.physio.ie
Wrist Tendonitis Treatment

• Avoid aggravating activity until pain subsides

• Rest affected wrist
  – Avoid painful movements

• Support and immobilize with brace

• Ice for 48-72 hours q1-2 hrs for 20 min

• Sling if pain is severe
  – Prevent hand from hanging down

• NSAIDS

• Surgery for tendon release

Source: www.physio.ie
Wrist Tendonitis Prevention

- Breaks from aggravating activity - work
- Make your work station as ergonomic friendly
- Wear wrist support/brace if recurring
- Exercise
  - Stretching/flexing wrist prior to work out

Source: www.computingcomfort.org
Carpal Tunnel Syndrome (CTS)
CTS Causes

- Unknown
**CTS Symptoms**

- **Intermittent numbness**
  - Thumb, index, long and radial half of the ring finger

- **Numbness often occurs at night**
  - Wrists are held in flexed position during sleep

- **Pain**
  - Wrists, hands, loss of grip strength

- **Weakness**
  - Thenar muscles
  - Occur if remains untreated
CTS – Common Conditions Put Pressure On Nerve

- Obesity
- Oral contraceptives
- Hypothyroidism
- Arthritis
- Diabetes
  - Prediabetes
- Trauma

- Intrinsic factors
  - Exert pressure within tunnel

- Extrinsic factors
  - Pressure exerted from outside tunnel
  - Lipomas, ganglion, vascular malformation

- Job tasks
  - Highly repetitive manual acts or specific wrist postures
  - Cause not established
CTS Epidemiology

• Can affect anyone
• 90 % of all nerve compression syndromes
• U.S. > 1 out of 20
• Caucasians have the highest risk
• Female 3:1 Male
• Age 45-60
• 10% reported cases of CTS are < age 30
CTS: Conditions Associated With

• Heredity

• Size of the carpal tunnel

• Systemic diseases
  – RA - causes inflammation of the flexor tendons
  – Hypothyroidism
    – Myxedema causes deposition of mucopolysaccharides of perineurium of the median nerve and tendons passing thru the carpal tunnel

• Pregnancy
  – Hormonal changes and water retention swells synovium

• Previous injuries of the wrist especially fractures

• Diabetes mellitus

• Obesity
CTS Diagnosis

• Past History

• Clinical findings
  – Numbness in distribution of the median nerve
  – Nocturnal symptoms
  – Thenar muscle weakness, atrophy
  – + Tinels, Phalens sign
  – Electrophysiological testing
CTS: Phalen’s Maneuver

- Defined as pain and/or paresthesia in the median-innervated fingers with one minute of wrist flexion
- The quicker the numbness starts
  - The more advance the condition
CTS Tinel’s Sign

• Lightly tap the skin over the flexor retinaculum

• Elicit a sensation of tingling or “pins and needles” in nerve distribution

• Defined as pain and /or paresthesia of the median-innervated fingers with percussion over the median nerve

• Less sensitive, but more specific than Phalen’s sign
CTS Prevention

• Avoid repetitive stress

• Work modification
  – Ergonomic equipment
  – Wrist rest, mouse pad

• Stretches isometric exercise
CTS Prognosis

• Long-term chronic CTS
  – Can results in permanent nerve damage

• Trigger thumb
  – Common in months following surgery
CTS Treatment

• NSAIDs

• Corticosteroids (po, injections)
  – Provides temporary relief

• Splinting
  – Wear brace at night
  – During activity causing stress on wrists

• Surgical release of transverse carpal ligament
  – Recommended with constant numbness, muscle weakness or atrophy

Source: www.healthcentral.com
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Cleveland Clinic

Every life deserves world class care.