Slide 1

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presents:

Slide 2

Neuropathic or Peripheral Nerve
Pain in the Causation and
Maintenance of many Orthopedic
Diagnosis's

Slide 3

I.F.O.M.P.T. 2000
Perth Australia
Slide 4

For the sake of this Breakout Session

Neuropathic Pain = CRPS I
Peripheral Nerve Pain = Peripheral Nerve Sensitization

Schafer, Axel, Interrater Reliability of a New Classification System for Patients with Neurol Low Back-Related Leg Pain. JMMT 2009: 17(2) pgs 109-117

Slide 5

Peripheral Nerve Sensitization (PNS) =
"Sensitization arising from nerve trunk inflammation causing increased axonal mechanosensitivity with absent significant denervation."

Ehia EI, Inflammation with no axonal damage of the rat saphenous nerve trunk induces ectopic discharge and mechanosensitivity in myelinated afferents. Neuroscience Letters 2001; 311(1):48-52

Slide 6

Review of Pathophysiological Considerations in:

CRPS I,
Peripheral Nerve Pain, Peripheral Nerve Sensitization
Three Major Causations for Symptom or Sign Manifestations With Peripheral Nerve Pathology

1. Adherance of the epi-endo- or perineum leading to loss of elongation for normal functional patterns.
2. Pseudoneuroma formation leading to pain avoidance or direct distal inflammatory responses.
3. Prior peripheral nerve injury leading to excessive protection and physiological reaction to second load or trauma.

Adherance

Physiological, Inflammatory and Neuropathic Pain

“A region of potential abnormal impulse initiation may not become symptomatic until local adhesions or a change in posture causes undue mechanical forces to be brought to bear.”

Woolf C J
Advances and Technical Standards in Neurosurgery
Development of a Pseudoneuroma

Caused by:
- Direct mechanical disruption of the epineurum, perineurium, or endoneurium.
- Rupture of epi or endoneural blood vessels.
- Chemical disruption of the epineurial barrier such as exposure to nucleus pulposus in annular tears.

Development of a "Pseudoneuroma"

"Obstruction to the venous outflow from a funiculus slows intrafunicula circulation."

Increase intrafunicular pressure=Vascular collapse=Breakdown of Blood Nerve Barrier=Decrease axonal Transport=Stasis=Hypoxia=Excitability"

"Painful Lesion" ..... Sjostrands I et al., Lundberg et al.
"Pseudoneuroma" ..... LeBlan M ET AL, Cavanaugh et al.
Slide 13

Slide 14

“When pain from localised peripheral neural pathology becomes widespread, tenderness can be found along the course of the affected nerve.”

• Devor, Lishman, Quitner, etc.

Slide 15

Neurogenic Rheumatica

The usual diagnosis of arthritis, bursitis, neuritis, muscular rheumatism, fibrositis should not be made until cervical nerve root irritation has been considered. Joint swelling may be directly caused by inflamed nerve roots.

Research into "algias" suggest that the reason that many problems once referred to as "itis", do not have normal inflammatory product findings. Instead neurogenic inflammatory products are found such as PABA etc. Possible neurogenic causation of Lat. Epicondalgia...?

Coopetiers, Fernandez-De-Las-Penas

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Central Sensitization

Repeated injury to the ipsilateral or contralateral nerve root or its corresponding peripheral nerves.
1st Stage: Peripheral Afferent Sensitivity
(Pathological Changes That Occur After Injury)

- Increased Mechano-sensitivity. (Ax: Stretch Receptor, hyper to compression due to hypoxia)
- Altered Chemo-sensitivity. (Epi, Peri, Endoneural Breakdown)
- Altered Trophic Influence on Peripheral Target Tissue. (Neurogenic Rheumatica.)
- Altered Connections (C-fiber re-investment, Phenotypic Switch)
- Pain Avoidance Movement Patterns (Nerve Elongation Avoided)

Neuropathic Subjective Exams


painDetect
Freynhagen, Current Medical Research and Opinion:vol.22, pgs 1911-1920 2006

Pain Drawings
Analog Pain Scale
NeuPSIG Guidelines  
IASP 2011

“Common Denominators” that are found in Neuropathic Pain

1. Area of symptoms fits the distribution of a nerve
2. Quantitative—hyper or hypoesthesia
3. Qualitative—alodynia or dysesthesia
4. Temporal—after sensation, summation.

Objective: Use of Standard Neurological Eval

- **Reflexes.** Maybe hyper-reflexive.
- **Pinwheel.** Hyper/hypo pin point sensation, may have increased receptor fields, after sensation. Rate Pain Responses.
- **Vibratome:** 128 HZ Tuning Fork: Mechanical Hypoesthesia
- **Von Frey Fibers:** Impaired tactile discrimination, Two point discrimination.
- **Strength.** Test in provoked position.
- **Clonus, Babinski etc.**

Used to help determine the “health” of the nerve and to rule out other neurological considerations.

Strength and Reflex Testing in a Provoked Position.

Patient’s limb or spine can be placed in a specific provoked position and strength or reflexes retested against neutral positioning.
Signs of Adverse Response to the Physical Examination of Neural tissues

“THE DUCK”

• Posture
• Active Dysfunction
• Passive Dysfunction
• Nerve Trunk Hyperalgesia
• Tender Points
• Specific Signs of Local Dysfunction

Posture

Neural tissue sensitivity, provocation tests and protective reflex muscle activity.

Protective antalgic posture. The recognition of protective muscle hypertonicity.

Coppieters M. 2003, Hall T 1996, Sherrington CS 1900
“Transformation of flexion withdrawal reflex from high threshold phasic to low threshold tonic.”

May cause symptoms of their own or maintain neural irritability.

Woolf C J 1987, Patterson, M. 1986

Active Dysfunction
Add and Subtract Nerve Provocation Positions

Patterson 1986, Woolf 1987,
Slide 34

Biomechanics of Neuromeningeal Tissues Involved in Active and Passive Testing
Upper Limb and Lower Limb “Provocation” Testing

Slide 35

Slide 36
Muscular Recruitment Patterns with and without Provocation.
Use of surface electrode EMG
Slide 43

Modified Slump Test

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Slide 44

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Slide 45

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Slide 46

Testing of “Slump” and Modified SLR in Normals


Slide 47

Passive Dysfunction
(Add and Subtract Nerve Provocation Positions)


Slide 48

Ectopic Sensory Discharges & Paraesthesiae in Patients with Disorders of Peripheral Nerves, Dorsal Roots & Dorsal Columns.

“Provocation Tests showed abnormal discharges on sensory pathways using microneurography”

Nordin M. ET AL PAIN Vol. 20, Pgs. 231-245, 1984
Validity of Upper Limb Neurodynamic Tests for Detecting Peripheral Neuropathic Pain.


Slide 51
Muscular tightness in and out of provocation.

Mid-scaple with median bias
Mid-scaple with ulnar bias

Nerve Trunk Hyperalgesia (Mechanical Alodynia)

Elvey 1981
Fernandez de Las Penas 2010
Hall and Marshall 2009
Hall and Quintner 1996
Lishman, Nordin, M 1994
Devor, M 1991
“When pain from localised peripheral neural pathology becomes widespread, tenderness can be found along the course of the affected nerve.”

• Devor, Lishman, Quitner, etc.

Nerve Trunk Palpation

• Sciatic Nerve L4, L5, S1, S2, S3 Through the buttocks at neck of femur.
• Common Peroneal Nerve L4, L5, S1, S2 Neck of fibular
• Tibial Nerve S1, S2 At the level of the calcaneum, post. To the post. Tibial artery
• Femoral Nerve L2, L3, L4. At the inguinal region lateral to the femoral artery.
• Saphenous Nerve L2, L3, L4. Medial tibial condylar plateau.
• Lateral Cutaneous Nerve of thigh L2, L3. Medial to the ASIS

Reliability, validity and diagnostic accuracy of palpation of the sciatic, tibial and common peroneal nerves in the examination of low back related leg pain

Slide 58

Algometer: Mechanical Alodynia
Pressure Pain Thresholds (PPT) and Max Pain Pressure Thresholds (MPPT)

Slide 59

Tender Points
Will be Found in Muscles Innervated by Involved Nerve

Slide 60

Specific Signs of Local Dysfunction

- Loss of passive joint motion at specific levels of dysfunction. Will have a painful, springy or bogey end feel often with a muscular rebound noted in multifidi etc.

- Should display tenderness from problem site distally, rarely proximally.
Slide 61

Putting it All Together

- Meshing Subjective, Objective, and Patient History to come to a Differential Diagnosis

Slide 62

Subjective
1. Pain diagram and reproduction of symptoms during exam should match. Often produce dominant and specific pain symptom related to original complaints.
2. Complaints of sensitivity (hyperesthesia, allodynia, and temperature abnormalities) should be objectified.
3. Patients lack of ability to precisely describe abnormal sensations should not be regarded as signs of malingering. Often use words such as “heavy”, “puffy”, “electrical”, “burns”, “like a toothache in my……..etc.
4. Pay close attention to reports of multiple trauma involving the same nerve roots. Make sure to question prior history.

Slide 63

Working With the Duck (Objective Findings)
1. Must determine peripheral neuropathy vs spinal neuropathy or radiculopathy, vs. systemic disease?. (Reflex, Pinwheel, Strength,Tinel’s, Distalization etc.)
2. Anatomical Relationships between pain locality and spinal motion segments must match if central problem exists. (Example: Plantar Fascitis…. L4S, L5S1)
3. Must have specific correlation between provocation tests of neural tissue and spinal segmental signs.
   (ex. Positive Obturator Nerve Tests and L5S1 Segment Dysfunction= NO CORRELATION)

4. There must be specific correlation between neural palpation tests and provocation test of neural tissue.
   (Example: Positive Femoral Nerve Palpation with Positive Femoral Provocation Tests= CORRELATION)

5. Trigger Points or “Tender Points” should correlate with Spinal Level of Involvement unless only postural. i.e.: Quad Lumborum, Hip Ext. Rotators, Hamstrings etc.
   (Example: L5,51 dysfunction and Trigger Point or Tender point in the Gastrocs)

6. Should be able to “turn on” and “turn off” findings by use of specific provoking and relieving positions.

Research throughout the world is revealing that 17-37% of chronic pain patients “may have a neuropathic pain causation”

Slide 67

“Orthopedic”, or “Sports Medicine” Patient Diagnosis That May Have Neuropathic Causation or in Whom Symptoms are Maintained by Neuropathic Input. (Lower Quadrant)

• Failed Back Syndrome
• Piriformis Syndromes
• Sciatic Scoliosis
• Chronic Trochanteric Bursitis
• Fibromyalgia-TRP’s
• Chronic Hamstring Tears
• Chronic Plantar Fasciitis
• Chronic Peroneal Tendonitis/Tears
• Chronic Achilles Tendonitis
• Chronic Adductor Strains
• Compartment/Tunnel Syndromes

Slide 68

Upper Quarter “Orthopedic” Patient Diagnosis That May Have Neurogenic Causation or in whom symptoms are maintained by Neurogenic Input.

• Adhesive Capsulitis- “Frozen Shoulder”
• Lateral Epicondylitis
• “Whiplash Syndrome”
• DeQuervain’ Tenosynovitis
• Failed Cervical Decompression
• Tunnel Syndromes
• “Pseudo” Sympathetic Reflex Dystrophy
• Levator Scapular Syndrome
• Shoulder Impingement Syndrome
• Fibromyalgia-TRP’s
• Monarticular Arthritis