# Central post-stroke pain

Denise St. Louis,  
BScN, CNN(c)  
Stroke Resource Nurse  
District Stroke Centre  
Windsor Essex

## Clinical Features of the Thalamic Syndrome of Dejerine and Roussy, 1906
- Resolving mild hemiplegia  
- Hemianesthesia  
- Hemi-ataxia  
- Astereognosis  
- Choreathetoid movement of limbs on affected side  
- Severe paroxysmal pain that is very often intolerable on the affected side

## Central Post Stroke Pain
- Now recognized that stroke occurring anywhere along the sensory tract can produce similar symptoms  
- Most often related to an infarct of the thalamus or surrounding structures  
- Cortical processing may play role  
- Occasionally from abscess or tumor  
- Can be lacunar, embolic or hemorrhagic  
- Brain-related central pain, approximately 90% of cases have a vascular etiology
Incidence

- Develops in about 8% of stroke patients
- Pain is moderate to severe in 5% of patients
- Most often present in 1 or 2 months after stroke, occasionally as long as 6 years
- Often appears as patient is experiencing functional improvement

Significance

- Can cause extreme discomfort and distress and may limit a patient's ability to participate in rehab.
- Delayed onset means have passed out of care of stroke experts, therefore CPSP is often underdiagnosed and undertreated

Causes

- Hyperexcitation in damaged sensory pathways, damage to central inhibitory pathways, or a combination of the two
- Thought to be damage to the lateral spinothalamic pain and temperature pathways
- Appreciation of pinprick and temperature nearly always impaired
Pathophysiology

- Ordinarily, when tissue is damaged the nociceptive pathway is activated
- In CPSP this pathway is damaged, so pain does not have the same mechanism, nor does it respond to the same treatments

Functional and Structural changes observed

- Altered neurotransmitter environments and receptive fields of surviving neurons
- Synaptic reorganization adjacent to and distant from the site of original injury
- Altered functional activity close to and distant from injury
- Neurons upstream from injury become hyperexcitable
- Imbalance between inhibitory and excitatory impulses

Characteristic symptoms of pain after stroke “MD HAS CP”

- Muscle pains, described as cramping, band-like constriction, crushing
- Dysesthesias (abnormal, unpleasant, poorly localized sensations) (central dysesthesias are characterized by delayed onset)
- Hyperpathia - heightened response to noxious stimuli (i.e., cold)
- Allodynia - interpretation of nonpainful stimuli as being painful (bedding touching the legs)
Cont’d

• Shooting/lancinating pain-intermittent pain with clear sensory discriminative characteristics
• Circulatory pain-described as pins and needles, stings, jabs, walking on broken glass
• Peristaltic/visceral pain-bloating, fullness in bladder, burning pain with urinary urgency

Autonomic Instability

• Hallmark of neurogenic pain
• Changes in cutaneous blood flow(usually vasoconstriction) in the painful area
• Exhibit lowered skin temperature in the affected area

Treatment

• 70 per cent of stroke survivors with CPSP find medication helps
• Ordinary painkillers are not usually helpful
• Amitriptyline, which is a drug used to treat depression
• Neurontin(Gabapentin) and Lyrica(pregabalin), which are used to treat epilepsy
• Usually patients started on a low dose, which is then gradually increased
• If the first medication does not work either switch or add another drug
Deep Brain Stimulation

- In rare cases, pain is severe and other treatments have been unsuccessful
- Small electrical leads are placed deep within the brain and are connected to a battery-powered machine, which sits under the skin
- Can only be carried out in specialist centres and it is not suitable for everyone
- Research shows that deep brain stimulation is effective in reducing pain for some people, though only a small number of people have taken part in the studies

Nursing Implications

- Watch for symptoms that may indicate the stroke survivor is in pain
- Suspect in patients with extravagant sensory histories and lesion(s) anywhere along the neospinothalamic tract
- Acknowledge the survivor’s pain
- Report the pain to the appropriate person, so that a specialized consultation can take place

Prognosis

There is no cure for CPSP, but pain management aims to help people cope better with their pain in the long term. The programmes are run by a combination of healthcare professionals, such as physiotherapists, clinical psychologists and doctors who can help with poor posture, frustration, depression and other obstacles. People learn about pacing their actions, breathing and relaxation, positive thinking and exercise patterns. Pain management programmes strive to improve quality of life.
References


References cont’d


The Pathophysiology of Pain:
Transmission of a pain impulse in the body
How Analgesics Affect the Pain Impulse

Definitions: Pain

“Unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (IASP)

Pain is “whatever the experiencing person says it is, existing whenever he/she says it does.”


Definitions: Nociceptive pain

- Associated with tissue damage and inflammatory processes due to the release sensitizing substances from damaged cells
- Sensitizing substances directly stimulate nearby peripheral primary afferent neurons which are called nociceptors
Definitions: Neuropathic pain

- Abnormal pain impulse generated in the peripheral or central nervous system without there being an actual pain stimulus.
- Caused by a primary lesion or dysfunction in the nervous system that leads to abnormal processing of sensory input.

The Transmission of a Pain Impulse in the Body (Nociception)

The Pathophysiology of Pain:
The transmission of a pain impulse in the body.

The Pain Impulse
The Pathophysiology of Pain: The transmission of a pain impulse in the body

Sensitizing substances released

Peripheral nerve is stimulated

Impulse travels along peripheral nerve fibres
and carries impulse towards spinal cord

The Pathophysiology of Pain:
The transmission of a pain impulse in the body

Impulse enters the spinal cord

Impulse must “jump” across synapse
The Pathophysiology of Pain: The transmission of a pain impulse in the body

Excited nerve ready to release neurotransmitters

Neurotransmitters cross synapse

Neurotransmitters excite fibres of spinal nerve
The Pathophysiology of Pain:
The transmission of a pain impulse in the body

Spinal nerve is stimulated and impulse travels up the spinal cord

Impulse travels up the spinal cord to the brain stem and thalamus (relay station)
The Pathophysiology of Pain:
The transmission of a pain impulse in the body
Impulse creates 2 areas of activity in the brain

Areas of the CNS where sensations & emotional aspects of pain are perceived

The body’s natural pain blocking mechanism
**Basic Process of Normal Pain Transmission**

1. **Transduction**
2. **Transmission**
3. **Perception**
4. **Modulation**

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**How analgesics affect the pain impulse**

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**Transduction**

**NSAIDS** — block prostaglandin synthesis
**NSAIDS** – block prostaglandin synthesis

Caution in renal insufficiency, GI bleed, CHF

**Transmission**

**Acetaminophen** - thought to act in the CNS?

Caution in liver dysfunction
Max daily dose 4000mg or less

**Transmission**

**Opioids**

The “keys” that lock pain transmitters out
Areas of the CNS where sensations & emotional aspects of pain are perceived

Areas of CNS where opioid receptors are found (in blue)

Transmission

Antiepileptic Drugs (gabapentin, tegretal pregabalin)

Local Anesthetics
Enhancing the body’s natural pain blocking mechanism

Antidepressants
• amitriptyline
• SNRIs (duloxetine, venlafaxine)

Neuropathic Pain

Abnormal pain impulse generated in the peripheral or central nervous system without an actual peripheral pain stimulus
Neuropathic Pain

Caused by a primary lesion or dysfunction in the nervous system that leads to abnormal processing of sensory input.

Common Conditions

- Diabetic peripheral neuropathy
- Trigeminal neuralgia
- Post herpetic neuralgia
- Central pain syndrome (stroke, MS)
- Phantom limb pain
- Sciatica
- DDD
- Failed back surgery
- Post surgical (thoracotomy, mastectomy)
- Cancer
Neuropathic Pain

Allodynia

Hyperalgesia

Description of quality of pain is critical.

Neuropathic Pain Treatment

• Pharmacological
• Physical (PT, TENS)
• Surgical (constructive, destructive)
• Psychotherapeutic
Pharmacological

Antiepileptic Drugs (gabapentin, tegretal, pregabalin)
Local Anesthetics

Pharmacological
Enhancing the body's natural pain blocking mechanism

Antidepressants
• amitriptyline
• SNRIs (duloxetine, venlafaxine)

Trigeminal Neuralgia
Questions

Back Pain
Colleen Berthiaume RN(EC)
Neurosurgical Outpatient Clinic
Hotel-Dieu Grace Hospital

Definition: Back Pain

- Activity intolerance due to lower back or back-related leg symptoms of less than 3 months
Back Pain Facts

• Back problems are among the most common chronic conditions in Canada.
  

Back Pain Facts

• Four out of five adults will experience at least one episode of back pain at some time in their lives.
  

Fun Facts

• Disabling back injury and back pain affect 38% of nursing staff.
  
Low Back Pain: Acute and Chronic

- Acute Back Pain: within 12 weeks of pain onset
- Chronic Back Pain: more than 12 weeks since onset of pain

Mechanical vs. Nonmechanical

- Mechanical worsens after bending or lifting
- Nonmechanical occurs at rest

Nonmechanical Back Pain Causes

- 1% Neoplasia ex. Multiple Myeloma
- 0.01% Infection ex. Osteomyelitis, septic discitis, paraspinous abscess, epidural abscess, shingles
- 0.3% Inflammatory Arthritis ex. Ankylosing spondylitis, psoriatic spondylosis, Reiter’s, Inflammatory Bowel Disease, Paget’s, sheuermann’s disease.
- 2% Visceral ex. Abdominal aneurysm, prostatitis, endometriosis, PID, nephrolithiasis, pyelonephritis, perinephric abscess, pancreatitis, cholecystitis, penetrating ulcer
Mechanical Back Pain: Causes

- Problems with back muscles, tendons, ligaments or fascia
- Problems with disks
- Problems with vertebrae
- Problems with spinal cord

- Taken all together these account for 97% of all back pain

Mechanical Back Pain: examples

- Lumbar strain / sprain (70%)
- Degenerative disc / facets (10%)
- Disc herniation (4%)
- Spinal stenosis (3%)
- Osteoporotic compression fracture (4%)
- Spondylolisthesis (2%)
- Traumatic fractures (<1%)
- Congenital disease (<1%)
- Spondylolysis (stress fracture)
- Spinal instability and internal disc disruption (controversial)

Lumbar Strain (70%)

- Results from stretching, tearing of muscles, tendons, ligaments, or fascia of back secondary to trauma or chronic mechanical stress
Lumbar Strain

- Most common cause of acute low back pain
- Occurs frequently between ages 20 and 40
- Patient experiences minimal discomfort during/immediately after injury, pain and stiffness occur 12-36 hours later as soft tissue swells
- Aggravated by standing and flexion, relieved with rest and reclining

Lumbar Strain: Risks

- Chronic occupational strain
- Obesity
- Exaggerated lumbar lordosis
- Abnormal forward-tipped pelvis
- Weak paraspinal and/or abdominal muscles
- Unequal leg length
- Chronic poor posture
- Inadequate/inappropriate conditioning
- Suboptimal lifting habits

Degenerative Disk Disease (10%)

- Age-related processes, such as osteoarthritis
- General wear and tear makes disks susceptible to injury
- Gradual, insidious onset of pain accompanied by morning stiffness or stiffness after prolonged immobility
Degenerative Disk Disease

Examples of Disc Problems

Disk Herniation (4%)

- occurs with tears in annulus fibrosis which allows contents of nucleus pulposus to protrude, nerve roots are compressed causing pain and other neurological signs

Disk Herniation

- Occurs most frequently in young and middle ages
- Nucleus pulposus becomes more fibrotic and dehydrated with age, resulting in lower incidence for this age group
- Most begin to improve within 6 weeks
- Over time the herniated portion regresses and about 2 out of 3 have partial or complete recovery at 6 months
Disk Herniation

- Nerve pain, described as sharp, shooting, electric type pain
- Associated with leg and foot pain
- Worsens with Valsalva Manoevers, strained urination, defecation, coughing, sneezing
- Parasthesia may occur in sensory distribution of a nerve root
- Deep tendon reflexes are absent or depressed in distribution of nerve root
- Muscular weakness and atrophy may result
- Most common disk ruptures affect L5 or S1 nerve roots

Dermatomes and Disks
Spinal Stenosis (3%)

- Narrowing of the spinal canal, soft tissue or bony encroachment pressing on the spinal cord
- Occurs in middle aged and older adults
- Gradual onset of bilateral leg pain and/or leg weakness and paraesthesia when walking, may also have cramping in buttocks
- Usually relieved when patient flexes lumbar spine or sits

Osteoporotic Compression Fracture (4%)

- Fractures related to normal aging, decrease in gonadal functioning or secondary causes such as corticosteroid use in systemic diseases.
- Causes chronic pain and fatigue, particularly in middle back
- Signs include spinal deformity such as kyphosis, scoliosis
Osteoporotic Compression Fracture

Kyphoplasty for Compression Fracture

Spondylolisthesis

- Slipping of one vertebra on an adjacent vertebra
- Most are from degeneration
- Most frequently affected areas are L5 and L4
Spondylolisthesis

Good News

• Surgical intervention will only be needed in approximately 10% of Acute Mechanical Low Back Pain

Nursing Implications: Patient Education

• Reassure that most recover from back problems within 4 to 6 weeks
• Introduce activities gradually as symptoms improve
• Walking: gentle, gradual stretching, sitting for only short periods, changing positions frequently
• Alternating Ice and Heat to decrease inflammation
• Instruct on core strengthening and low back stabilization exercises
• Decreasing stress which can increase pain
• Avoid constipation
BACK PAIN RED FLAGS!!!

- B bowel or bladder dysfunction
- A anesthesia (saddle area)
- C constitutional symptoms (fever, chills, unexplained weight loss)
- K chronic diseases
- P parasthesia
- A age > 50 years
- I IV drug use
- N neuromotor deficits

Cauda Equina Syndrome

- A surgical emergency!!!!!
- Constant pain in saddle distribution, urinary retention, fecal incontinence, and nerve pain
- Nerve roots are compressed and paralyzed, cutting off sensation and movement. Nerve roots that control the function of the bladder and bowel are especially vulnerable to damage
- If surgical intervention is not immediately available, permanent paralysis, impaired bladder and/or bowel control, loss of sexual sensation, and other problems may occur
- Even with quick surgical intervention, may not recover completely

References:

QUESTIONs?

Headaches
Colleen Berthiaume RN(EC)
Neurosurgical Outpatient Clinic
Hotel-Dieu Grace Hospital

Definition of Headache:
Diffuse pain in various parts of the head with the pain not confined to the area of distribution of a nerve.
Headache: Fast Facts

• Headaches are one of the most common pain-related problems presenting in family practice
• Are common during childhood, become more common and frequent during adolescence
• Boys are more often affected before puberty
• Girls are more often affected after onset of puberty

NOT ALL HEADACHES ARE THE SAME!

Primary Headaches (majority)
Secondary Headaches (2 to 10 %)

Primary Headaches

• Are caused by traction on pain sensitive structures, inflammation of vessels and meninges, vascular dilation, excessive muscle contraction, and dysregulation of the ascending brain stem serotonergic system
• Usually acute-recurrent and have no underlying disease process as their cause.
• Ex. migraine, tension-type and clusters
Secondary Headaches
- Are due to an underlying organic cause such as:
  - Brain abscess
  - Epidural hemorrhage
  - Cerebral aneurysm
  - Subdural hematoma
  - Encephalitis
  - Intracranial hemorrhage
  - Brain tumor

Red Flags!
- New onset after age 50
- Headache in child under 3 years
- Sudden onset of severe, "Thunderclap", "Worst headache of my life"
- Headache with signs of systemic illness (fever, stiff neck, rash)
- New onset headache in patient with risk factors for HIV or cancer
- Focal neurological s/s (other than aura)
- Papilledema
- Headache subsequent to head trauma

Migraine
More common in females
Can have a positive family history
Can last 4 to 72 hours
Often unilateral, throbbing head pain that is made worse with movement/activity
Associated symptoms: nausea, vomiting, photophobia, phonophobia
Women often report positive relationship with menses, remission with menopause
Two types:
  - Migraine with aura: visual prodromes, strange odors, paraesthesia (15%)  
  - Migraine without aura: most have this type
  - Triggers: Disrupted sleep, skipped meals, certain foods (cheese, chocolate, citrus fruits, foods containing nitrates), and monosodium glutamate, alcoholic beverages, especially red wine, stress, caffeine overuse
A Word about Auras......

Migraine Headache Treatment: Acute

- **Acute Treatment:**
  - NSAIDs, acetaminophen and triptans are the drugs of choice for treating acute migraine.
  - Take early in migraine attack to increase effectiveness
  - Consider nausea and vomiting: orally dissolving tablets/wafers, triptan nasal sprays, injectable sumatriptan

- **The response to medications is individual and idiosyncratic, even with medications that have similar molecular structure (trial and error)**

Acute Migraine Treatment:

- Aspirin 1000 mg (all severities)
- or
- Ibuprofen 400 mg (all severities)
- or
- Naproxen sodium 500 to 550 mg (all severities)
- or
- Acetaminophen 1000 mg (for mild to moderate)
- or

- If not effective: Triptan (all severities)
  - Sumatriptan 5 mg intranasal
  - or
  - Sumatriptan 70 mg intranasal
  - if relief occurs initially and headache returns
  - Take second dose of same triptan
  - if no relief
  - Try a different triptan
Acute Migraine Treatment: Cont’d

- If severe
  - Triptan
    - Sumatriptan 6 mg subcutaneous
- If triptans alone not effective or prolonged attack or recurrence
  - Nausea/vomiting
    - Metoclopramide 10 mg po up to 4 times daily
    - Domperidone 10 mg po/IV up to 3 times daily
  - Triptan + NSAID
    - Sumatriptan 50 to 100 mg
    - Naproxen sodium 500 to 550 mg
  - Triptan contraindicated (vasoconstrictor)

- Opioids
  - Not recommended d/t increased risk of medication overuse headache
  - But may be necessary when other meds are contraindicated or ineffective as rescue medication
    - Butalbital
      - Not recommended
      - Limited to exceptional circumstances of contraindication/effectiveness
      - Use for less than 10 days per month or increased risk of medication overuse/dependence
- Nausea/vomiting
  - Metoclopramide 10 mg up to 4 times daily
  - Domperidone 10 mg po/IV up to 3 times daily
  - *may improve absorption of analgesics
- Ergotamine

Migraine Prophylaxis Treatment Criteria

- Considered if:
  1. Recurrent migraine attacks cause significant disability despite optimal acute drug therapy
  2. Frequency of acute medication use is nearing levels that put patient at risk for medication overuse headaches:
     * use of acute medication for 10 days/month or more for triptans, ergotamines, opioids, and combination analgesics
     * Use of acute medications for 15 days/month or more for acetaminophen and NSAIDs
  3. Recurrent attacks with prolonged aura are occurring (hemiplegic migraine, basilar-type migraine, etc)
  4. Contraindications to acute migraine medications are making symptomatic treatment of individual migraine attacks difficult.
Migraine Prophylaxis Treatment

- **Beta-blockers**
  - Propranolol 80 to 200 mg daily  
  - Nadolol 80 to 160 mg daily  
  - Metoprolol 100 to 200 mg daily

- **Antidepressants**
  - Amitriptyline 10 to 100 mg daily
  - Venlafaxine 75 to 100 mg daily
  - Nortriptyline 10 to 100 mg daily at HS

- **Antiepileptics**
  - Topiramate 50 to 200 mg daily
  - Divalproex sodium 750 to 1500 mg daily
  - Gabapentin 900 to 2400 mg daily

- **Antivertigo Drugs**

Migraine prophylaxis Treatment

- **Vitamins, Minerals and Herbals**
  - Butterbur 75 mg BID
  - Riboflavin 400 mg daily
  - Magnesium citrate 300 mg TID
  - Co-enzyme Q10 100 mg TID

- **Other medications**
  - Candesartan 8 mg daily x 1 week, 16 mg daily thereafter
  - Flunarazine 10 mg at HS
  - OnabotulinumtoxinA 155 to 195 Units Injected as per protocol Q 3 months by experience clinicians only

Tension-type

- **Most common type**
  - Both genders
  - All ages (most commonly begins b/w 8 and 12)
  - Negative family history
  - Lasts 30 minutes to 7 days
  - Bilateral, can progress slowly, non-throbbing, mild to moderate pain
  - Dull pressure or band-like sensation
  - Physical activity does not worsen headache
  - Associated symptoms: usually none
  - Affects up to 80% of adults, accounts for more than half of headaches seen in primary care setting
Tension-Type Treatment

- OTC are usually effective
  - Ibuprofen 400 to 600 mg Q 4 to 6 hours max 3200 mg/day
  - Acetaminophen 650 mg Q 4 hours or 1000 mg Q 12 hours
  - Aspirin 650 mg Q 4 hours
  - Excedrin Extra Strength 2 tabs at start of attack, up to 8 per day

  - Excedrin Extra Strength = Acetaminophen (250 mg), Aspirin (250 mg), Caffeine (65 mg)

Cluster

- More common in men
- Age: mean age of onset = late 20's, incident ↓ with age
- More uncommon than migraine and tension-type
- Negative family history
- Frequently nocturnal and wakes patient from sleep
- Lasts 15 minutes to 3 hours
- Unilateral, severe, sharp, orbital, supraorbital, or temporal pain ALWAYS on the same side
- Associated s/s: At least one of the following present on the headache side, lacrimation, conjunctival injection, nasal congestion, ptosis or eyelid swelling, and rhinorrhea
- Attacks may occur once a day or as frequently as 8 times/day, occur in bouts which may last days to weeks, with most experiencing one bout/year

Cluster Treatment

- Acute
  - Sumatriptan (Imatrex) 6 mg subcut initially, may repeat in 1 hour, max 12mg/day
  - Sumatriptan (Imatrex) 5 to 20 mg spray nasally, may repeat after 2 hours, max 40 mg/day
  - 100% oxygen for 10 to 15 minutes, repeat as needed

- Preventative
  - Verapamil (Calan) 80 to 120 mg TID
Medication Overuse Headache

- “Acute headache medications may worsen a pre-existing headache disorder when taken too frequently (use of triptans, ergots, combination analgesics, or opioid-containing medication on 10 days a month or more, or use of acetaminophen or NSAIDs on 15 days a month or more). Patients with a history of migraine appear especially vulnerable to the development of medication overuse headache.”

- Guideline for Primary Care Management of Headache in Adults, 2012, Toward Optimum Practice

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<table>
<thead>
<tr>
<th>Symptom</th>
<th>Migraine</th>
<th>Tension-type</th>
<th>Cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Population</td>
<td>More common in females; starts early adolescence/early adulthood</td>
<td>Both genders, all ages</td>
<td>More common in men</td>
</tr>
<tr>
<td>Tension-type</td>
<td>Picromine</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>Typical Time of Onset</td>
<td>Any time of day</td>
<td>Late in the day</td>
<td>Noon</td>
</tr>
<tr>
<td>Duration</td>
<td>1 to 12 hours</td>
<td>10 minutes to 7 days</td>
<td>15 minutes to 3 hours</td>
</tr>
<tr>
<td>Characteristics</td>
<td>Unilateral, throbbing, made worse with movement</td>
<td>Bilateral, slowly progressing, mild to moderate, dull pressure, band-like pain, does not worsen with activity</td>
<td>Unilateral, severe, sharp, orbital, supraorbital, or temporal pain always on the same side</td>
</tr>
<tr>
<td>Associated Symptoms</td>
<td>Nausea, vomiting, phonophobia, photophobia</td>
<td>Usually none</td>
<td>At least 1: lacrimation, conjunctival injection, nasal congestion, photophobia, phonophobia</td>
</tr>
<tr>
<td>Comments</td>
<td>Relationship with menses, often has triggers, can be associated with aura</td>
<td>80% of adults, accounts for 1/2 of headache patients in primary care settings</td>
<td>Attacks may occur once a day; on rare occasions, may occur in clusters lasting days to weeks, with most experiencing one bout per year</td>
</tr>
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Nursing Considerations

- Recognize Red flags!
- Provide education and support for lifestyle changes: Identifying, avoiding and managing triggers, education regarding relaxation techniques, stress management skills, maintaining good sleep hygiene, eating proper meals, using acute and prophylactic meds appropriately.
References


Questions?