Neck Pain

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Assessing Neck Pain

• Obtained detailed pain history
• Assess for red flags
• Assess range of neck movements
• Perform a neurological exam
• Identify psychosocial factors that may suggest increased risk for chronicity and disability
• The negative predictive value of ‘red flags’ clinical findings is high;
  – if no ‘red flags’ are present, then it is unlikely that a serious spinal abnormality has been missed.

• Individual positive findings must be interpreted with care, as their positive predictive value for diagnosing serious disease is poor (Williams and Hoving, 2004)
Red Flags

• 'Red flags' that suggest cancer, infection, or inflammation:
  – Malaise, fever, unexplained weight loss.
  – Pain that is increasing, is unremitting, or disturbs sleep.
  – History of inflammatory arthritis, cancer, tuberculosis, immunosuppression, drug abuse, AIDS, or other infection.
  – Lymphadenopathy.
  – Exquisite localized tenderness over a vertebral body.

• 'Red flags' that suggest severe trauma or skeletal injury:
  – A history of violent trauma (e.g. a road traffic accident) or a fall from a height. However, minor trauma may fracture the spine in people with osteoporosis.
  – A history of neck surgery.
  – Risk factors for osteoporosis: premature menopause, use of systemic steroids.
• 'Red flags' that suggest vascular insufficiency:
  – Dizziness and blackouts (restriction of vertebral artery) on movement, especially extension of the neck when gazing upwards.
  – Drop attacks.

• 'Red flags' that suggest compression of the spinal cord (myelopathy):
  – Insidious progression.
  – Neurological symptoms
    • gait disturbance, clumsy or weak hands, or loss of sexual, bladder, or bowel function.
  – Neurological signs:
    • Lhermitte's sign: flexion of the neck causes an electric shock-type sensation that radiates down the spine and into the limbs.
    • UMN signs in the lower limbs (Babinski's sign — up-going plantar reflex, hyperreflexia, clonus, spasticity).
    • LMN signs in the upper limbs (atrophy, hyporeflexia).
    • Sensory changes are variable, with loss of vibration and joint position sense more evident in the hands than in the feet.
<table>
<thead>
<tr>
<th>Disk Level</th>
<th>Root</th>
<th>Pain Distribution</th>
<th>Weakness</th>
<th>Sensory Loss</th>
<th>Reflex Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>C4–C5</td>
<td>C5</td>
<td>Medial scapular border, lateral upper arm to</td>
<td>Deltoid, supraspinatus,</td>
<td>Lateral upper arm</td>
<td>Supinator reflex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>elbow</td>
<td>infraspinatus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5–C6</td>
<td>C6</td>
<td>Lateral forearm, thumb and index finger</td>
<td>Biceps, brachioradialis, wrist</td>
<td>Thumb and index finger</td>
<td>Biceps reflex</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>extensors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C6–C7</td>
<td>C7</td>
<td>Medial scapula, posterior arm, dorsum of</td>
<td>Triceps, wrist flexors, finger</td>
<td>Posterior forearm, third</td>
<td>Triceps reflex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>forearm, third finger</td>
<td>extensors</td>
<td>finger</td>
<td></td>
</tr>
<tr>
<td>C7–T1</td>
<td>C8</td>
<td>Shoulder, ulnar side of forearm, fifth finger</td>
<td>Thumb flexors, abductors,</td>
<td>Fifth finger</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>intrinsic hand muscles</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Provocative tests include the foraminal compression test (Spurling maneuver), in which the neck is passively bent toward the symptomatic side and the examiner applies pressure (approximately 7 kg) to the patient’s head (a positive test reproduces symptoms); the shoulder abduction test, in which the patient is asked to place the hand of the symptomatic arm on the head (a positive test reduces or eliminates symptoms); and the neck distraction test, in which the patient is supine and the examiner, holding the chin and occiput, applies a gradual pulling force (a positive test reduces or eliminates symptoms).25
Table 2. Physical Findings Associated with Myelopathy.

<table>
<thead>
<tr>
<th>Findings</th>
<th>Clinical grading*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperreflexia; hypertonia; clonus of the ankle, knee, or wrist; pathological reflexes or signs, such as the Babinski sign, Hoffmann’s sign (flexion and adduction of the thumb when the examiner flexes the terminal phalanx of the long finger), and Lhermitte’s sign (a sensation of electrical shock radiating down the spine, precipitated by neck flexion)</td>
<td>Mild</td>
</tr>
<tr>
<td>Sensory symptoms; subjective weakness; hyperreflexia (with or without Hoffmann’s sign or the Babinski sign); no functional impairment</td>
<td>Moderate</td>
</tr>
<tr>
<td>Objective motor or sensory signs (a score of &gt;4 out of 5 on the Medical Research Council scale); either no or mild functional impairment (e.g., mild slowing of gait)</td>
<td>Severe</td>
</tr>
<tr>
<td>Objective motor or sensory signs with functional impairment (e.g., hand weakness, unsteady gait, sphincter disturbance)</td>
<td></td>
</tr>
</tbody>
</table>

* Clinical grading is performed on the basis of the extent of symptoms, signs, and functional impairment.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral entrapment neuropathies (e.g., carpal tunnel syndrome)</td>
<td>Hypoesthesia and weakness in the distribution of the entrapped nerve (e.g., in carpal tunnel syndrome, medial three digits and opponens pollicis; in ulnar entrapment, fourth and fifth digits and thumb adductor); Tinel’s sign and positive Phalen’s maneuver often present in carpal tunnel syndrome; normal reflexes; nerve-conduction studies abnormal in carpal tunnel syndrome but normal in cervical radiculopathy</td>
</tr>
<tr>
<td>Disorders of the rotator cuff and shoulder</td>
<td>Pain in the shoulder or lateral arm region that only rarely radiates below the elbow and is aggravated by active and resisted shoulder movements, rather than by neck movements; normal sensory examination and reflexes</td>
</tr>
<tr>
<td>Acute brachial-plexus neuritis (neuralgic amyotrophy or Parsonage–Turner syndrome)</td>
<td>Typically causes severe pain in neck, shoulder, and arm, which is followed within days to a few weeks by marked arm weakness, typically in the C5–C6 region, as the pain recedes (unlike in cervical radiculopathy, in which pain and neurologic findings occur simultaneously)</td>
</tr>
<tr>
<td>Thoracic outlet syndrome</td>
<td>Pain in shoulder and arm aggravated by use of the arm; intermittent paresthesia, most commonly in the C5–T1 region (rare in cervical radiculopathy); reproduction of symptoms by provocation tests, including Roo’s test (the rapid flexion and extension of fingers while the arms are abducted at 90° and externally rotated 90°); neurologic examination usually normal; decreased radial pulse if associated with vascular compression (rare); nerve-conduction studies usually normal</td>
</tr>
<tr>
<td>Herpes zoster</td>
<td>Neuropathic pain in a dermatomal distribution, followed within several days by the appearance of the typical vesicular rash</td>
</tr>
<tr>
<td>Pancoast syndrome</td>
<td>Pain in shoulder and arm due to compression of the brachial plexus; paresthesia and weakness in the C8–T1 region (intrinsic hand muscles); ipsilateral ptosis, myosis, and anhidrosis (Horner’s syndrome)</td>
</tr>
<tr>
<td>Sympathetically mediated syndromes</td>
<td>Diffuse pain and burning in arm and hand associated with swelling, hyperesthesia, alodynia, and vasomotor changes (temperature and color); neurologic examination usually normal</td>
</tr>
<tr>
<td>Referred somatic pain from the neck</td>
<td>Pain referred from cervical structures, including the intervertebral disks and zygapophyseal joints, that is usually felt in a segmental distribution (i.e., structures from the C5–C6 level, posterior neck, and supraspinatus fossa; C6–C7 level, supraspinatus fossa and scapula). Unlike in cervical radiculopathy, the pain is rarely felt below the elbow and the neurologic examination is normal</td>
</tr>
</tbody>
</table>
Figure 3-18
Anatomy Review
Anatomy Review
Biopsychosocial Model of Pain

- George Engel 1977

THE PAIN STARTS IN MY HUSBAND’S LOWER BACK, THEN IT TRAVELS UP HIS SPINE TO HIS NECK, THEN IT COMES OUT HIS MOUTH AND INTO MY EARS. AND THAT’S WHY I GET THESE HEADACHES.
Pain Management

"Whoa! That was a good one! Try it, Hobbs—just poke his brain right where my finger is!"

"You're gonna be fine, honey. We're taking you to an acupuncturist."
Medical Pain Management

• Pharmacotherapy

• Interventional (Procedural)
  Diagnostic (steroid)
  Neuroablation
  Neuromodulation
  Surgery
Classification of Pain

- Chronologically
  - Acute
  - Persistent or Chronic
- Mechanistically
  - Nociceptive
  - Inflammatory
  - Neuropathic
  - Dysfunctional
  - Mixed
- Disease based
  - Cancer
  - Non-cancer
Acute vs Chronic Pain

- Biomedical considerations
  - Neuropathic pain, central sensitisation
- Psychological considerations
- Social considerations

“It is much more important to know what sort of a patient has a disease than what sort of a disease a patient has”
Sir William Osler 1849-1919
Medications

- Paracetamol
- NSAIDs
- Opioids
- Antidepressants
- Anticonvulsants
- Antiarrhythmics
Paracetamol

- Synthesized 1877
- First used 1887
- Avoided in favour of phenacetin until 1950s
NSAIDs

1763

1899

1999
Opioids

- Morphine isolated 1806 and industrially produced in 1820s
- Opiates were the standard treatment for pain in the 19th Century
- Concerns expressed by 1870s about the “morphine habit”
Opioids


- Useful for short-term management
- Long-term benefits questionable
Oxford League Table

- Codeine 60
- Tramadol 100
- Paracetamol 1000
- Oxycodone IR 5 + Paracetamol 1000
- Paracetamol 1500
- Celecoxib 200
- Paracetamol 500
- Morphine 10 (intramuscular)
- Tramadol 150
- Pethidine 100 (intramuscular)
- Ibuprofen 200
- Diclofenac 50
- Naproxen 500/550
- Naproxen 400/440
- Oxycodone IR 10+Paracetamol 1000
- Ibuprofen 400
- Oxycodone IR 15
- Paracetamol 1000 + Codeine 60
- Celecoxib 400
- Diclofenac 100
- Ibuprofen 600/800
- Etoricoxib 100/120
- Etoricoxib 180/240

NNT
### Opioid Trial Data

**TABLE 1. Controlled Studies: Summary of Results**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Study Type</th>
<th>Type of Pain</th>
<th>n/N</th>
<th>Drug</th>
<th>Daily Dose (mg)</th>
<th>Follow-up</th>
<th>Pain Relief</th>
<th>Level of Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kjærsgaard et al.</td>
<td>RCT</td>
<td>Osteoarthritis of the hip, in elderly</td>
<td>83/75</td>
<td>Codeine with acetaminophen</td>
<td>180</td>
<td>4 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Moran et al.</td>
<td>RCT, crossover</td>
<td>Rheumatoid arthritis in most patients</td>
<td>20</td>
<td>CR morphine vs. placebo</td>
<td>Up to 120</td>
<td>10 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Modin et al.</td>
<td>RCT, crossover</td>
<td>Musculoskeletal or soft tissue</td>
<td>46</td>
<td>CR codeine vs. placebo</td>
<td>200-400</td>
<td>1 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Jamison et al.</td>
<td>RCT</td>
<td>Back pain</td>
<td>24/12</td>
<td>Oxycodeine or CR morphine plus oxycodone</td>
<td>Up to 130mg</td>
<td>16-32 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Sherer-Reid et al.</td>
<td>RCT, crossover</td>
<td>Cervicobrachial syndrome, fibromyalgia</td>
<td>6</td>
<td>Codeine vs. ibuprofen or placebo</td>
<td>120 mg</td>
<td>12 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Watson and Bibel</td>
<td>RCT, crossed</td>
<td>Postherpetic neuralgia</td>
<td>38</td>
<td>CR oxycodone vs. placebo</td>
<td>24-62 mg</td>
<td>8 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Caldwell et al.</td>
<td>RCT</td>
<td>Osteoarthritis</td>
<td>71/36</td>
<td>CR oxycodone or oxycodone vs. placebo</td>
<td>Up to 60mg</td>
<td>8 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Perone et al.</td>
<td>RCT</td>
<td>Osteoarthritis spine and trunk</td>
<td>31/35</td>
<td>CR codeine vs. placebo</td>
<td>Up to 400mg</td>
<td>4 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Roth et al.</td>
<td>RCT</td>
<td>Osteoarthritis hip and knee</td>
<td>44/44</td>
<td>CR oxycodone, high dose vs. placebo</td>
<td>Up to 40mg</td>
<td>14 wk</td>
<td>(0)</td>
<td>+ (0)</td>
</tr>
<tr>
<td>Fune et al.</td>
<td>RCT, crossed</td>
<td>Phantom limb pain</td>
<td>12/12</td>
<td>CR oxycodone vs. placebo</td>
<td>70-100mg (300mg in one patient)</td>
<td>4 wk</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Caldwell et al.</td>
<td>RCT</td>
<td>Osteoarthritis</td>
<td>73/73/76/73</td>
<td>CR morphine (24 h) or CR morphine (12 h)</td>
<td>30mg</td>
<td>4 wk</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Maier et al.</td>
<td>RCT, crossed</td>
<td>Mixed postherpetic neuralgia</td>
<td>49</td>
<td>CR morphine vs. placebo</td>
<td>Up to 180mg</td>
<td>2 wk</td>
<td></td>
<td>+ (0)</td>
</tr>
<tr>
<td>Raja et al.</td>
<td>RCT</td>
<td>Postherpetic neuralgia</td>
<td>76/44</td>
<td>CR morphine vs. placebo or tricyclic antidepressant</td>
<td>15-225 mg morphine, 40-140 mg methadone</td>
<td>2-4 wk</td>
<td></td>
<td>+ (0)</td>
</tr>
<tr>
<td>Cimbel et al.</td>
<td>RCT</td>
<td>Diabetic neuropathy</td>
<td>63/52</td>
<td>CR oxycodone vs. placebo</td>
<td>20-120 mg</td>
<td>6 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Morley et al.</td>
<td>RCT, crossed</td>
<td>Mixed neuropathic</td>
<td>11/11</td>
<td>CR oxycodone vs. placebo or methadone</td>
<td>20 mg</td>
<td>20 d</td>
<td></td>
<td>+ (0)</td>
</tr>
<tr>
<td>Rowbotham et al.</td>
<td>RCT</td>
<td>Peripheral and central neuropathic pain</td>
<td>43/58</td>
<td>CR oxycodone vs. placebo</td>
<td>Up to 11.3 mg (approximately 60mg morphine equivalent)</td>
<td>8 wk</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Watson et al.</td>
<td>RCT, crossed</td>
<td>Diabetic neuropathy</td>
<td>35/36</td>
<td>CR oxycodone vs. active placebo (benzodiazepine)</td>
<td>10-40 mg</td>
<td>4 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Stuurd et al.</td>
<td>RCT</td>
<td>Chronic low back pain</td>
<td>7/75/87</td>
<td>CR oxymorphone or oxycodone vs. placebo</td>
<td>20-250 mg (oxymorphone), 40-440 mg (oxycodone)</td>
<td>3 wk</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Markenson et al.</td>
<td>RCT</td>
<td>Osteoarthritis</td>
<td>56/51</td>
<td>CR oxycodone vs. placebo</td>
<td>20-120 mg</td>
<td>13 wk</td>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>
Real World Data

Editorial

Opioids for chronic pain: Taking stock

Critical issues on opioids in chronic non-cancer pain:
An epidemiological study

Jørgen Eriksen a, Per Sjøgren a,*, Eduardo Bruera b, Ola Ekholm c, Niels K. Rasmussen c

Topical review

Ethical issues in opioid prescribing for chronic pain

Jane C. Ballantyne a,*, Lee A. Fleisher b,1

1 Penn Pain Medicine Center, Department of Anesthesiology and Critical Care, Fattalman Building, 1840 South Street, Philadelphia, PA 19146, USA
2 Department of Anesthesiology and Critical Care, University of Pennsylvania Health System, 3400 Spruce Street, 6 Tudor Building, Philadelphia, PA 19104, USA
A Feasibility Study of Transdermal Buprenorphine Versus Transdermal Fentanyl in the Long-Term Management of Persistent Non-Cancer Pain

- 46 Participants (22 Buprenorphine, 24 Fentanyl)
- 30 completed 12 months treatment
At 12 months 11% of patients had significant pain relief.
Overdose Deaths Involving Opioids, Cocaine and Heroin: United States, 1999–2010

% Change 2006-10

+ 21%

- 44%

+ 45%

<table>
<thead>
<tr>
<th>Year</th>
<th>Opioid Analgesics</th>
<th>Cocaine</th>
<th>Heroin*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>4030</td>
<td>3822</td>
<td>1963</td>
</tr>
<tr>
<td>2000</td>
<td>4400</td>
<td>3544</td>
<td>1843</td>
</tr>
<tr>
<td>2001</td>
<td>5528</td>
<td>3833</td>
<td>1784</td>
</tr>
<tr>
<td>2002</td>
<td>7456</td>
<td>4599</td>
<td>2092</td>
</tr>
<tr>
<td>2003</td>
<td>8517</td>
<td>5199</td>
<td>2084</td>
</tr>
<tr>
<td>2004</td>
<td>9857</td>
<td>5443</td>
<td>1879</td>
</tr>
<tr>
<td>2005</td>
<td>10928</td>
<td>6208</td>
<td>2010</td>
</tr>
<tr>
<td>2006</td>
<td>13723</td>
<td>7448</td>
<td>2089</td>
</tr>
<tr>
<td>2007</td>
<td>14408</td>
<td>6512</td>
<td>2402</td>
</tr>
<tr>
<td>2008</td>
<td>14800</td>
<td>5129</td>
<td>3041</td>
</tr>
<tr>
<td>2009</td>
<td>15597</td>
<td>4350</td>
<td>3279</td>
</tr>
<tr>
<td>2010</td>
<td>16651</td>
<td>4183</td>
<td>3038</td>
</tr>
</tbody>
</table>

Source: CDC
Hospitalisations for heroin/other opioid poisoning Australia (AIHW, 2009)
Universal Precautions in Pain Medicine: A Rational Approach to the Treatment of Chronic Pain

Douglas L. Gourlay MD, MSc, FRCPC, FASAM, Howard A. Heit MD, FACP, FASAM, Abdulaziz Almahrezi MD, CCFP

Article first published online: 17 MAR 2005
DOI: 10.1111/j.1526-4637.2005.05031.x
10 Steps of Universal Precautions for Opioid Use in Pain Medicine¹

1. Diagnosis with appropriate differential
2. Psychological assessment and risk of addictive disorders
3. Informed consent
4. Agree on treatment with your patient
5. Assess pain & function
6. Start an opioid trial
7. Regularly assess pain and function
8. Regularly assess the 6 As of pain medicine
9. Periodic review
10. Keep complete documentation

Antidepressants

• TCAs
  – Imipramine 1955
  – Amitriptyline 1961

• SNRIs
  – Venlafaxine 1993
  – Duloxetine 1998
Gabapentanoids

- Gabapentin
  - 1994
- Pregabalin
  - 2004
Number-needed-to-treat in Neuropathic Pain

Procedures

• Percutaneous techniques
  – Nerve blocks
  – Joint injections
  – Neuroablation
• Neuromodulation
  – Chemical
  – Electrical
• Surgery
Nerve Root and Epidural Injections
Facet Joint Injections
Medial Branch Blocks
Neuroablation

• Thermal radiofrequency
• Pulsed radiofrequency
Cervical Radiofrequency Neurotomy
Neuromodulation

• The process of inhibition, stimulation, modification, regulation or therapeutic alteration of activity, electrically or chemically, in the central, peripheral or autonomic nervous systems
Neurostimulation

- Leads or paddle
- Implantable pulse generator

- Stimulate spinal cord, DRG, nerves or fields
Spinal Cord and DRG Stimulation
Pain Management Programs

• Components
  – Exercise
  – Psychology

• Variables
  – Patients
  – Treatment
  – Staffing

• Outcomes
  – Pain
  – Function
  – Satisfaction
  – Psychology
  – Vocational
  – Cost-Effectiveness
Evidence Based Medicine

Parachutes reduce the risk of injury after gravitational challenge, but their effectiveness has not been proved with randomised controlled trials.
Evidence Based Medicine

Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials
Gordon C S Smith, Jill P Pell

Abstract

Objectives To determine whether parachutes are effective in preventing major trauma related to gravitational challenge.

Design Systematic review of randomised controlled trials.

Data sources Medline, Web of Science, Embase, and the Cochrane Library databases; appropriate internet sites and citation lists.

Study selection Studies showing the effects of using a parachute during free fall.

Main outcome measure Death or major trauma, defined as an injury severity score > 15.

Results We were unable to identify any randomised controlled trials of parachute intervention.

Conclusions As with many interventions intended to prevent ill health, the effectiveness of parachutes has not been subjected to rigorous evaluation by using randomised controlled trials. Advocates of evidence based medicine have criticised the adoption of interventions evaluated by using only observational data. We think that everyone might benefit if the most radical protagonists of evidence based medicine organised and participated in a double blind, randomised, placebo controlled, crossover trial of the parachute.

BMJ 2003;327:1459
Levels of Evidence

– Level 1a: what I believe
– Level 1b: what I believe despite the evidence
– Level 2a: RCTs that agree with what I believe
– Level 2b: any other evidence I can quote
– Level 3a: expert opinion if it agrees with me
– Level 3b: expert opinion if I am the expert
– Level 4: RCTs that disagree with what I believe
– Level 5: what you believe that I don't

After Bleck, 2000