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The Rocky Mountains of Workers' Compensation

CLIMBING THE PEAKS IN THE PRACTICE OF WORKERS' COMPENSATION

2023 WORKERS' COMPENSATION PRACTICE GROUP SEMINAR

SEPTEMBER 27-29, 2023 | PENDRY PARK CITY | PARK CITY, UTAH

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Complex Regional Pain Syndrome:
The Complexities in Workers' Compensation Cases

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The Complexities in Workers' Compensation Cases

September 29, 2023

Jeffrey E. Hazlewood, MD

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- Board Certification (ABPMR) in Physical Medicine and Rehabilitation
- Sub-specialty Board Certification (ABMS) in Pain Medicine

- **Non-interventional Pain Management** with emphasis on Evidence Based Medicine Guidelines

- Private Practice in Lebanon, TN with emphasis on:
  - Workers' compensation injuries (acute and chronic)
  - Electrodiagnostic Testing
  - IME's, Record Reviews
    -Pain management, Causation, Impairment Ratings (5th & 6th)

CLIMBING THE PEAKS
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Definition of Pain

- International Association for the Study of Pain (IASP) defines **pain**:

  "an unpleasant sensory and emotional experience associated with actual or potential tissue damage"

  -this definition recognizes both a sensory as well as emotional-affective component to pain

Complex Regional Pain Syndrome

- The hallmark of this condition is a characteristic **burning pain** that is present without stimulation or movement, that **occurs beyond the territory of a single peripheral nerve,** and that is **disproportionate** to any suspected inciting event.

Definitions

- Reflex Sympathetic Dystrophy (RSD)
  - *No longer appropriate terminology*
- **Complex Regional Pain Syndrome (CRPS)**
  - **CRPS Type I**
  - **CRPS Type II *(causalgia)***

Definitions (Merskey 1994)

- **CRPS Type I:**
  - A syndrome that usually develops after an initiating noxious event
  - Not limited to the distribution of a single peripheral nerve
  - Is apparently disproportionate to the inciting event
  - Associated at some point with evidence of edema, changes in skin blood flow, abnormal sudomotor activity in the region of the pain, allodynia, or hyperalgesia

Definitions (Merskey 1994)

- **CRPS Type II:**
  - Burning pain, allodynia, and hyperpathia
  - Usually in the hand or foot after partial injury of a nerve or one of its major branches

Historical Perspective

- Table of Other Common Names
  - Acute atrophy of bone
  - Causalgia
  - Posttraumatic osteoporosis
  - Reflex neurodystrophy
  - Shoulder-hand syndrome
  - Sympathetic maintained pain syndrome
  - Sudeck’s atrophy
  - Sympathalgia
  - Traumatic vasospasm

Demographic Data

- Incidence: 5-17 cases per 100,000 persons each year

- Age 40 -60 most common in literature
- Women affect > Men (4:1)
- Upper extremity affected more than lower

- Remember, CRPS is very rare!!!

Predisposing Factors/Precipitating Events

- Trauma (most common)
  - Fractures (50%)
  - Soft tissue injury including contusion, laceration, crush injuries
  - Spinal cord injury
  - Traumatic brain injury

Predisposing Factors/Precipitating Events

- Surgical Procedures
  - Carpal tunnel release (most common-<0.5%)
  - Meniscectomy
  - Other hand or foot procedures
  - Amputation (rare)
  - Laminectomy, discectomy (rare) – this may be one cause of “failed back syndrome”; up to 20% can have a sympathetic component

Predisposing Factors/Precipitating Events

- Medical Conditions
  - Arthritis of cervical spine
  - Rotator cuff disorders
  - Post myocardial infarction
  - Post CVA with hemiparesis/hemiplegia --- 12% in one study
  - Peripheral neuropathy
  - Neoplasms – brain, lung, breast ovarian, etc.
  - Others: ALS, DM, acute DVT

Predisposing Factors/Precipitating Events

- Idiopathic (no obvious inciting event-25%)

- Psychological factors
  - Conversion disorder
  - “RSD personality” or predisposing personality features – *controversial*

******There are case reports of single digit, patella only involvement, and “total body RSD”!!***

Symptoms and Signs

• Spontaneous Pain	>95%
• Edema	85%
• Stiffness/Contracture	50%
• Motor Abnormalities	>50%
• Vasomotor Instability	50%
• Sudomotor Change	45%
• Discoloration	30%
• Temperature Change	25%

TABLE 15-25

Objective Diagnostic Criteria Points for Complex Regional Pain Syndrome

Local clinical signs	Points
Vasomotor changes:	
• Skin color: mottled or cyanotic	1
• Skin temperature: cool	1
• Edema	1
Sudomotor changes	
• Skin dry or overly moist	1
Trophic changes:	
• Skin texture: smooth, nonelastic	1
• Soft tissue atrophy: especially digit tips	1
• Joint stiffness and decreased passive motion	1
• Nail changes: blemished, curved, talonlike	1
• Hair growth changes: fall out, longer, finer	1
Radiographic signs	
• Radiographs: trophic bone changes, osteoporosis	1
• Bone scan: findings consistent with CRPS	1

Note: CRPS indicates complex regional pain syndrome.

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Three Stages of CRPS

- **Stage I – Acute, Inflammatory** (“red hot”)
  - 0 – 3 months (**signs usually occur w/in 3 months**)
  - Aberrant sensory perceptions
  - Puffy ***swelling*** (non-pitting), ***redness, warmth***
  - Sweating may be increased or decreased
  - Pain out of proportion to injury
  - Pain is intense, burning, aching, or throbbing
  - Allodynia and hyperalgesia
  - Increased skin temperature
  - Occasionally see rapid hair and nail growth
  - Decreased ROM

Three Stages of CRPS

- **Stage II** – **Dystrophic Phase** (“cold blue”)
  - 3 – 6 months
  - Decreased hair growth and brittle nails, markedly decreased sweating
  - Edema (hard) and greatly limited ROM, **atrophy**
  - Cyanosis and ***coolness***
  - Skin dryness
  - Increased stiffness
  - See behavioral changes/ “chronic pain syndrome”

Three Stages of CRPS

- **Stage III – Atrophic Phase**
  - >6 – 12 months
  - Chronic Stage
  - Pale skin, ***cold extremity***
  - Usually quite painful
  - Skin is usually ***smooth and glossy*** with significant subQ ***atrophy***
  - Permanent contractures
  - Weakness, spasticity, increased reflexes, and movement disorders

Budapest Criteria

TABLE 15-24

Diagnostic Criteria for Complex Regional Pain Syndrome

1) Continuing pain, which is disproportionate to any inciting event.
2) Must report at least 1 symptom in *3 of the 4* following categories: _____ Sensory: Reports of hyperesthesia and/or allodynia _____ Vasomotor: Reports of temperature asymmetry and/or skin color changes and/or skin color asymmetry _____ Sudomotor/Edema: Reports of edema and/or sweating changes and/or sweating asymmetry _____ Motor/Trophic: Reports of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin)
3) Must display at least 1 sign[a] at time of evaluation in *2 or more* of the following categories: _____ Sensory: Evidence of hyperalgesia (to pinprick) and/or allodynia (to light touch and/or deep somatic pressure and/or joint movement) _____ Vasomotor: Evidence of temperature asymmetry and/or skin color changes and/or asymmetry _____ Sudomotor/Edema: Evidence of edema and/or sweating changes and/or sweating asymmetry _____ Motor/Trophic: Evidence of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin)
4) There is no other diagnosis that better explains the signs and symptoms.
[a] A sign is counted only if it is observed and documented at time of the impairment evaluation.

Three Stages of CRPS (Radiologic Changes)

Stage I
- Usually normal (+/- periarticular osteoporosis)
- Positive bone scan (abnormal @ 4-5 wks)

Stage II
- Osteopenia

Stage III
- Severe osteopenia; can see erosions(45%)

Radiologic Changes in CRPS

- **X-ray** diagnosis only helps late; only see changes in 40% of cases
- **MRI** can show early changes (boney edema, soft tissue swelling at weeks to months) and can pick up missed diagnoses – fracture, AVN; positive in 50-70%of cases

Scintigraphy

- Triple Phase Bone Scan (TPBS)
  - Phase 1—blood flow Phase 2—blood pool
  - Phase 3—bone phase

Phase 1 and 2 show asymmetric uptake in limb; **phase 3 is most sensitive and shows increased **periarticular uptake**

TPBS in CRPS


SIL, GEORGINA 08 Feb 99
SIL, GEORGINA 08 Feb 99
SIL, GEORGINA 08 Feb 99
PLOW SUM
BLOOD PO
PLANTAR
SIL, GEORGINA 08 Feb 99
SIL, GEORGINA 08 Feb 99
SIL, GEORGINA 08 Feb 99
RT-LAT 4.5HRS
LT-LAT 4.5HRS
PLANTAR 4.5HRS

Three Phase Bone Scan
Upper Extremity CRPS

- *Wűppenhorst N, et al. Clin J Pain. 2010 Mar-Apr; 26(3): 182-9. doi: 10.1097/AJP.0b013e3181c20207*

- **Sensitivity** 31% to 50%; **Specificity** 83% to 100%
- Highest sensitivity (69%) and specificity (75%) was for **Phase 3** of the three phase scan
- Accuracy decreased if CRPS present **> 5 months** before scan obtained

Triple Phase Bone Scan

- So not very sensitive but fairly **specific**

- *If TPBS is +, then probably is CRPS*
- If TPBS is -, then don't know

- A positive bone scan patient may respond better to prednisone per one study

Diagnostic Testing

- Laboratory Tests
  - All normal including calcium, phosphorous, and alkaline phosphatase
  - ESR either normal or mildly elevated
- Electromyography
  - Normal except with causalgia secondary to peripheral nerve injury or have an underlying nerve pathology (neuropathy, radiculopathy,etc.)

Diagnostic Testing

- Sympathetic Blockade
  - **Controversial**; if negative, still can have CRPS
  - Must take into account placebo response
  - Look for **objective** improvement also

DO NOT FORGET:

- The last point of the Budapest Criteria:
  - **“There is no other diagnosis that better explains the signs and symptoms”**
  - Therefore, due to the rarity of the condition, it is a ***diagnosis of exclusion***

Budapest Criteria

TABLE 15-24

Diagnostic Criteria for Complex Regional Pain Syndrome

1) Continuing pain, which is disproportionate to any inciting event.
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4) There is no other diagnosis that better explains the signs and symptoms.
[a] A sign is counted only if it is observed and documented at time of the impairment evaluation.

Differential Diagnoses

- Musculoskeletal conditions
  - Thoracic outlet syndrome
  - Radiculopathy
  - Rotator cuff tear or tendinitis
  - Tenosynovitis
  - **Occult fractures**

- Neurological abnormalities
  - CTS and other entrapment neuropathies
  - Painful neuropathic conditions (Diab. Neur.)

Differential Diagnoses

- Rheumatologic Conditions
  - Rheumatoid arthritis, SLE, scleroderma
  - Erythromelalgia

- Vascular Disorders
  - **Peripheral vascular disease** (pain, color changes, edema, temperature changes)
  - **Acute DVT**
  - Lymphedema

DO NOT FORGET TO BE A CLINICIAN!!

- **Differential Diagnosis:**
  - **Unrecognized general medical problems**
  - **Somatoform disorder**
  - **Factitious disorder**
  - **Malingering**
  - **Disuse**
- **All associated physical and radiologic findings can be due to disuse**
- **Therefore, in the medicolegal literature, the diagnosis is very controversial**

This Means …

- A **forensic psychiatric** evaluation should be performed
  - **NOT** by a masters level psychologist who routinely "rubber stamps" patients as "appropriately depressed" and "OK for invasive pain procedures"
  - **BUT** by a doctorate level psychologist or psychiatrist who can better assess psychological diagnoses (that may lead to **aberrant/behavioral disuse**)

CRPS Epidemiology

- So somewhat less than ***10%*** of all injuries are potentially work related.

- Duman (2007) reported ***76%*** of 168 cases developed RSD due to a job-related injury
  - Duman I, et al. *Clinical Rheumatology* 2007; 26: 1433-1437

CRPS Epidemiology

- Verdugo and Ochoa discovered an **81%** rate of **workers compensation** claims among people who had been given a diagnosis of CRPS.
  - Verdugo RJ, Ochoa JL. *Muscle Nerve* 2002;23(2):198-205

CRPS Epidemiology

- Olmstead County (Mayo) **5.5 cases per 100,000 person-years**
  - Sandroni P et al. Complex Regional Pain Syndrome Type I: Incidence and Prevalence in Olmstead County, a population-based study. *Pain* 2003: 103: 199-207

Medical School

- “When you hear hoofbeats, think horses, not zebras.”
- Hypertension is probably not a pheochromocytoma

Pathophysiology

- Have peripheral , central, inflammatory, and immune mechanisms at play
- *In a "nutshell"—**Wide-Dynamic Range (WDR) Neuron Theory***:
  - Trauma results in peripheral release of neurokinines (substance P, glutamate, etc); sympathetically maintained pain begins with activation of unmyelinated 'C' nocioceptors in the periphery inputting into the dorsal horn of the spinal cord stimulating the central WDR neurons. The WDR neurons are excited and sensitized, threshhold is decreased, which in turn sensitizes the periphery to be more responsive to afferent impulses—"**wind up**"
  - In later stages the pain may become independent of sympathetic input

Pathophysiology

- "*Central sensitization*" is induced by past or ongoing nociception with alteration of dorsal column WDN which magnify sensory input as pain
- Results in "*expansion and exaggeration of brain receptive fields*" far beyond the original distribution of nociception
- See then an "*upregulation*" phenomenon (which then plays a key role in the perpetuation of sympathetically maintained pain syndromes)

Treatment

- **Prevention** after surgery

--Edema—contrast baths, elevation, graded compression, massage

--Contractures—passive and active ROM, mobilization, orthotics

--Muscular atrophy—strengthening, progressive stress loading, hand therapy

--Hypersensitivity—contrast baths, TENS, desensitization therapy

--Emotional distress—relaxation training, biofeedback

--Early mobilization is critical after surgery, CVA

--Vitamin C for wrist fractures (500 mg x 50 days)

Treatment

- Early Diagnosis
  - *Treatment is more successful if begun early*
  - Requires a high degree of clinical suspicion, careful observation for early signs and symptoms, and diagnosis based on clinical criteria rather than waiting for testing

Treatment

- Comprehensive Multidisciplinary Approach
  - Physical Therapeutics
    - **Edema control**
    - **Therapeutic exercises** – ROM, stress loading of jts
    - **Physical modalities** – superficial heat paraffin baths, superficial cold, ultrasound, TENS
    - **Local injections** – especially for bicipital tendonitis
    - **Hand therapy**
    - **Desensitization techniques** – massage, contrast baths, paraffin baths, whirlpool treatments, ice and heat modalities (ultrasound)
    - May have to use oral meds and nerve blocks to allow these

Treatment

- Comprehensive Multidisciplinary Approach
  - Sympathetic Blockade
    - **Stellate or lumbar sympathetic ganglion blocks**—single injection or catheter for prolonged infusion
    - Cervical or lumbar epidural blocks—single injection or catheter
    - IV Regional blocks with Bier block technique—using bretylium, reserpine, guanethidine
    - Peripheral nerve blocks
    - Blocks usually work only in stage I or early stage II

Treatment

- Local Sympathetic Blocks
  - Local anesthetic is administered in the region of the stellate ganglion or the lumbar paravertebral sympathetic ganglia for UE/LE pain, respectively
  - Purpose: **selectively interrupt sympathetic NS** control of the extremity, while leaving somatic pathways unchallenged; may also modulate the immune system
  - Must make sure the blockade is **complete**(Horner's response, **temperature change**, etc); systemic complications are rare

Treatment

- ***Must use in conjunction with physical therapy (multimodal approach)!!!***
- **Usually try 2 blocks before** discontinuing; if working, try usually up to 6 blocks (sometimes more)
- If 6 blocks help but pain/signs continue, consider **radiofrequency ablations (now out of vogue)**
- If no better with sympathetic blocks, then consider **regional non-sympathetic blocks**

Treatment

- **Epidural clonidine**
- **IV Phentolomine** (but have alot of side effects and false +'s)
- **IV Lidocaine**
- **Regional non-sympathetic blocks**
  - Scalene, brachial plexus/lumbosacral plexus

Treatment

- Sympathetic Blocks

  - Pitfalls:
    - False-+ responses can occur—due to placebo effects, systemic effects of local anesthetics, spread of agent to adjacent tissues/nerves, unreliable patient report of block effects **(placebo response is 50-60%!!!)**

    - Can also have false –'s: blocks can be less than complete; can also have other concomitant nerve pathologies present and unreliable patient reports

Treatment

- Comprehensive Multidisciplinary Approach
  - **Pharmacological Management**
    - **Prednisone**—60-80 mg/day for one week then taper over 2-3 weeks; (***risks***: high BS, hypertension, immunosuppression, osteoporosis, poor healing of fusion or grafts, AVN, GI bleed, pituitary-adrenal suppression)
      - best in the acute phase; use with stomach protector
    - **Biphosphonates**—Fosamax 75 q wk X 2-3 months; especially for lower extremity CRPS and not walking much; use with GI protector

Treatment

- Comprehensive Multidisciplinary Approach
  - Pharmacological Management
    - Topical Capsacian or Dimethyl Sulfoxide-some evidence of support
    - Prazosin/Terazoxin—causes vasodilatation; not proven
    - Clonidine—use patch for allodynia; modulates adrenergic output at the level of the sc; not proven
    - NSAIDs—no reported benefits!
    - Calcitonin—dose 100-200 u/day SQ; if works, works quickly (within 1-2 weeks); esp for LE; questionable evidence
    - TCA's—use if dysesthetic, burning pain; no evidence supporting
    - Gabapentin, Pregabalin, Clonazepam-only gabapentin proven effective
    - Antiarrythmics—mexilitene, lidocaine pathes; symptomatic relief
    - Antidepressants—? help pain but do help associated depression
    - Opioid Analgesics—po, intrathecal morphine (+clonidine)—insufficient evidence
    - Botox—works on C-fibers; use for localized, early CRPS; ? support

Ketamine Treatment

- N-methyl-D-aspartate (NMDA) Antagonist
- Promising results in 2 small placebo-controlled trials—IV
- A larger 60 patient double-blinded randomized placebo controlled study showed significant pain improvement but not functional improvement
- 2018 report—A systemic review and meta-analysis by Zhao et al, *Current Pain and Headache Reports*
  - *Looked at 15 studies that summarized Ketamine infusion can provide clinically effective pain relief in short term (<3 months)*

Ketamine Treatment

- Concerns:
  - Small studies
  - Expensive
  - Safety issues:
    - Major risk is liver toxicity (up to 50% of the time)
    - Long term memory impairment
    - Cystitis and contracted bladder
    - Secondary renal damage
    - Respiratory depression
    - Hallucinations
    - A drug of abuse

Treatment

- Surgical Options
  - Typically reserved for patients who obtain inadequate or temporary relief from conservative treatment

  - ***Ablative Procedures***
    - **Radiofrequency ablation**
    - **Surgical sympathectomy**—reports vary from 100% success to 100%failure; can get recurrence of pain
    - Some patients can develop **post-sympathectomy neuralgia** post-procedure (secondary to denervation supersensitivity of peripheral receptors)

Treatment

- Surgical Options
  - **Motor Cortex Stimulation**
  - ***Salvage Procedures***
    - ***Tendon releases, joint capsulotomy***
    - ***Amputation—unsuccessful!***

Treatment

- **Spinal Cord Stimulation (Traditional)**

  - Experiments first performed by Reynolds in **1969**
  - Focus: on the descending pathways in the spinal cord and their inhibitory influence at the dorsal horn
  - Target of stimulation: the dorsal columns, the dorsal root fibers, and the descending inhibitory pathways

Treatment

- Spinal Cord Stimulation
  - CRPS I/II are common applications of SCS tx
  - The question of when to initiate SCS treatment has continued to evolve
    - Previously considered a treatment of last resort
    - Today, however, as the cost of medication can quickly exceed the cost of SCS, it may be less costly to implant the device sooner rather than later to avoid expensive polypharmacy
    - Early intervention my yield better outcomes
    - If used “late”, SCS can provide pain relief but limits opportunities to facilitate rehabilitation

Treatment

- Spinal Cord Stimulation

  - Adverse effects:
    - Life threatening complications are rare
    - **1/3 of patients** experienced: infections, dural puncture, local pain near the stimulator, equipment failure, stimulator revision, and stimulator removal

Other Concerns:

- Lack of compatibility in MRI scanners (*Spine* 2015 40(9))
- Not cost-effective per some studies (*Spine* 2011 36(24)

Treatment

- Spinal Cord Stimulation
  - Studies:
    - ***NEJM 343:618, 2000*** – 36 pt study; patients who received PT + SCS better pain relief than with PT alone
    - ***Barolat et al 1989, Robaina et al 1989, Kumar et al 1997***: 12-24 pt studies: " the response of SCS is variable in CRPS but very encouraging"
    - ***Turner (Pain Pin 2004):*** SCS + PT lead to significant modest levels of pain relief at 6 and 12 months; however, the modest gains in pain relief appeared to wane over time

Treatment

- Spinal Cord Stimulation
  - Studies:
    - A comprehensive search of world literature on SCS through Jan 2002 yields **only one randomized control trial study**, one cohort study, and 72 case reports—the RCT study showed a significant advantage for SCS in tx of failed back syndrome (CRPS not studied)
    - **There seem to be more studies for failed back syndrome**

Other Articles:

- *Pain* 2010 Jan;148:
  - SCS has high removal rates and can be associated with complications after implant (infection, malfunction, more pain, bleeding)
  - No evidence for greater effectiveness of SCS vs alternative treatments in **W/C patients** after 6 months

Other Articles:

- *Pain Medicine*, Vol 17, Issue 2, February 2016:
  - Complication rates vary from 30-40% (most common is **lead migration**)
  - Also see infection and pain over the implant

- Psychiatric disorders can manifest after implantation:
  - *Anesth Analg*. 2003 Jan;96(1)—Conversion disorder
  - *Psychosomatics*. 1999 Jan-Feb; 40(1)—Schizophreniform disorder
  - *Anesth. Analg*. 2006 Nov;103(5)—Panic attacks

Other Articles

- *Bussa, et al. Adult complex regional pain syndrome type I: a narrative review. PM&R **2017**; 9*
  - Points out SCS can reduce pain and improve quality of life when all conventional therapies have failed. However the effectiveness of SCS in relieving pain decreases over time

Newer Spinal Cord Stimulator Units Are Now Being Developed and Marketed

Traditional Units

- Deliver electrical impulses via spinal epidural electrode arrays (leads) at vertebral levels associated with perceived pain
- Traditional units are capable of delivering pulse frequencies in the range of 2 to 1,200 Hz, with typical application of approximately **40 to 60 Hz**
- The objective of these units: produce paresthesias that overlap the pain distribution, with the intent of masking pain perception

Newer Units

- Involves application of short-duration (30 microsec), high-frequency (**10 kHz**), low-amplitude (1 to 5 mA) pulses to the spinal epidural space in such a manner as not to produce paresthesia

Newer Units

- Medtronic
  - **“Intellis”**
  - Gives patients option to switch between high-dose and low-dose therapy
  - 40% smaller and recharges more quickly
- Nevro
  - **Senza II System**
- Abbott
  - **“BurstDR”**
- Boston Scientific
  - **“Spectra WaveWriter”**

Newer Units

- Newer Units **Targeting the DRG**
  - Abbott, Stimwave
  - Modulates the DRG to address focal chronic pain of the lower limbs due to CRPS eg
  - Advantages:
    - Specific: targets pain cells only in DRG
    - Predictable: DRG predictably located in the intra-foraminal location
    - Efficient: amplitudes can be set at the micro-amp level

Newer Units

- **Dorsal Root Ganglion Stimulation**
  - The **Accurate Study** (152 CRPS pts/RCT):
    - 81% had early benefit
    - 74% had 12 month durability success
    - 70% experienced 80% relief at 3 months
    - 95% did not experience stimulation outside the primary area of pain at 12 months

Recent Review Article

- O’Connell et al, *Implanted Spinal Neuromodulation Interventions for Chronic Pain in Adults (Review)*
  - Cochran Library Review
  - Evaluated research through 9/21

Recent Review Article

- Take Home Points:
  - Benefits do not necessarily outweigh risks
  - There is NO benefit measured in terms of functional improvement or reduction in meds
  - The benefits are minimal in terms of VAS score improvement (< than the 20-30% needed to be clinically meaningful)
  - Any benefits are short term only

Recent Review Article

- The adverse event possibility is rather high (including even death)
- No clear cut cost-effectiveness seen
- The studies are heavily biased
- The numbers of patients studied are not very high

Treatment

- Spinal Cord Stimulation
  - Economic Considerations
    - High initial investment costs
    - Several studies have demonstrated that, in the short to medium term, SCS is cost-saving when compared with conventional pain therapy for RSD
    - Costs of SCS are offset 2 to 3 years post-implantation by a reduction in post-implant healthcare costs
    - Kemler (Neurology, 2002): in the lifetime analysis, SCS per patient is $60,000 cheaper than control therapy for chronic RSD (although $4,000 more expensive in the first year due to high initial costs)

SCS -- SUMMARY

- Spinal Cord Stimulation
  - Studies supporting SCS are not large studies
  - More research needs to be done
  - Even with trials of SCS before implantation there is still a 50% failure rate some say
  - Even the trials are expensive
  - Possible adverse effects which are costly
  - Many variable factors which inhibit success can be present especially in WC cases where there is significant secondary gain potential, psychologically compromised patients, delay in timely diagnoses, large dosages of narcotics being used

OTHER TREATMENT OPTIONS

Psychological Treatment

- **Essential** (as in so many chronic pain syndromes)
- Includes:
  - Screening evaluation for somatoform/factitious disorders and help rule out malingering in medicolegal cases
  - MMPI reported to show elevated profile in hysteria, hypochondriasis, and depression
  - Cognitive Behavioral Therapy
    - Active, not passive mind-set, catastrophizing, fear avoidance management
  - Relaxation techniques
  - Biofeedback
  - Hypnosis
  - Counseling including family counseling / support groups

Teaching Self Care Skills

- **Understanding** – knowing how pain works
- **Accepting** – coming to terms with it emotionally
- **Calming** – being able to relax physiologically
- **Balancing** – living a lifestyle that doesn't increase pain
- **Coping** – what to do when it hurts besides take a pill or lie down

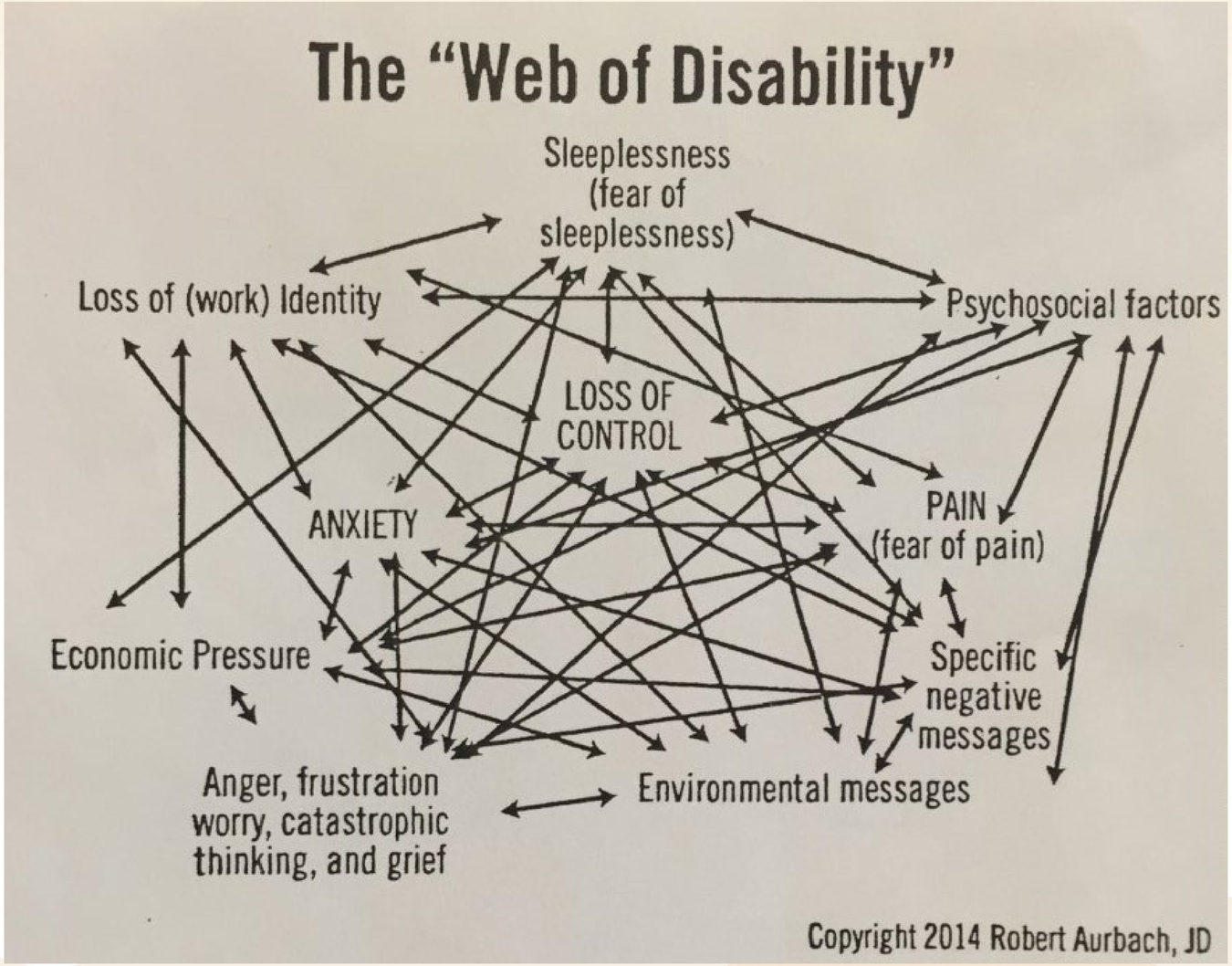
- ***Learning how to "turn down the volume control knobs and cope…"***

Cognitive Behavioral Therapy Pearls

- “Internal” focus vs “External” focus
- “Pain catastrophizing” is linked to “fear avoidance”
- Fear avoidance leads to “disuse syndrome” which further worsens the pain problem

Cognitive Behavioral Therapy Pearls

- Depression and disuse → decreased pain tolerance → promotion of “pain experience” and worsening muscle activity → vicious cycle/ **“CHRONIC PAIN SYNDROME”**



CLIMBING THE PEAKS IN THE PRACTICE OF WORKERS' COMPENSATION

Alternative Treatments

- Acupuncture
- Guided imagery/Visual imagery
- Hypnosis
- Meditation/distraction
- H-wave unit
- Yoga
- Cannabidiol oil
- Nutritional/anti-inflammatory diet
- Essential oils

Summary Standard Treatment

(In a nutshell)

- Typical Treatment Regimen:

  --Physical Therapy

- Steroid burst and Biphosphonates
- Neuropathic medications
- Opiates (last resort and cautiously)
- Antidepressants
- Lidoderm patches
- Psychology/CBT
- Sympathetic Blocks (with PT)
- ?Radiofrequency Ablation?
- Spinal Cord Stimulation

Prognosis

- Clear consensus that earlier diagnosis and intervention results in better outcome
- In one series of adult patients, only 16% had an excellent, 35% good, 26% satisfactory, and 6% fair response, with 17% poor response (not W/C study!!!)
- In another study, only 30% were eventually able to return to the same job

CONTROVERSIAL DIAGNOSIS

References

Excellent References

- AMA Guides Newsletter 11-12/06 by Dr. Robert Barth
  - Concerns over “behavioral disuse” and must r/o psychiatric diagnoses (as discussed)
- Auto Immunity Review Articles (2014, 2017, 2019)
  - Unbiased journal articles
  - Discusses unreliability of the diagnosis
  - Need for differential diagnoses

Excellent References

- Medicine, Science, and the Law 0 (0) 1-9
  - See high rates of somatoform disorders, opiate usage, and diagnostic uncertainties in these patients, especially when in litigation
- ACOEM and ODG
  - Discuss importance of Budapest Criteria #4
- AMA Guides NL 5-6/21
  - See high rates of prior psychopathology, primarily somatoform disorders (84%)
  - The diagnosis may cause iatrogenic harm

Excellent References

- “Disuse” Causing All The 9 Objective Findings Seen With CRPS (Including Severe Pain)
  - “Two-week Cast Immobilization Induced Chronic Widespread Hyperalgesia in Rats”; Ohmichi et al, *European Journal of Pain* 16 (2012)

IMPAIRMENT RATINGS

5th Edition

Impairment Ratings (5th Ed. AMA Guides)

- "Since a subjective complaint of pain is the hallmark of these conditions, and many of the associated physical signs and radiologic findings can be the result of disuse, the differential diagnosis is extensive …somatoform pain disorder…and malingering. Consequently, the ***approach to the diagnosis of these syndromes should be conservative and based on objective findings."*** p.496

Impairment Ratings

- Objective Diagnostic Criteria for CRPS (Table 16-16)
  - Local Clinical Signs
    - Vasomotor change
      - Skin color: mottled or cyanotic
      - Skin temperature: cool or warm
      - Edema
    - Sudomotor changes
      - Skin dry or overly moist
    - Trophic changes
      - Skin texture: smooth, nonelastic
      - Soft tissue atrophy: especially in fingertips
      - Joint stiffness and decreased passive motion
      - Nail changes: blemished, curved, talonlike
      - Hair growth changes: fall out, longer, finer

Impairment Ratings

- Objective Diagnostic Criteria for CRPS
  - Radiographic Signs
    - Radiographs: trophic bone changes, osteoporosis
    - Bone scan: findings consistent with CRPS
  - Interpretation:
    - >or= 8 : Probable CRPS
    - <8 : No CRPS

Impairment Ratings Determination for UE CRPS (p.496,497 – 5th Ed.)

- CRPS I
  - Rate for loss of motion of each joint involved
  - Rate for sensory deficits and pain (see tables 16-10, 16-13, 16-14, 16-15); value selected equals UE IR
  - Combine these two IR's to yield final UE IR

- CRPS II
  - Rate for loss of motion of each joint involved
  - Rate for sensory deficits and pain
  - Rate for motor deficits (see tables 16-11, 16-13, 16-14, 16-15)
  - Combine these three IR's to yield final UE IR

Impairment Ratings Determination for UE CRPS (p.343, 344 – 5th Ed.)

- Other method which is in my opinion more reasonable (Nervous System Chapter):
  - Table 13-22
  - Based on dominant or nondominant extremity involved
  - Based on ADL's, self-care use of extremity, digital dexiterity, grasping and holding of objects

Table 13-22 Criteria for Rating Impairment Related to Chronic Pain in One Upper Extremity (For UE)

Class 1		Class 2		Class 3		Class 4	
Dominant Extremity 1%-9% Impairment of the Whole Person	**Nondominant Extremity 1%-4% Impairment of the Whole Person**	**Dominant Extremity 10%-24% Impairment of the Whole Person**	**Nondominant Extremity 5%-14% Impairment of the Whole Person**	**Dominant Extremity 25%-39% Impairment of the Whole Person**	**Nondominant Extremity 15%-29% Impairment of the Whole Person**	**Dominant Extremity 40%-60% Impairment of the Whole Person**	**Nondominant Extremity 30%-45% Impairment of the Whole Person**
Individual can use the involved extremity for self-care, daily activities, and holding, but is limited in digital dexterity		Individual can use the involved extremity for self-care and can grasp and hold objects with difficulty, but has no digital dexterity		Individual can use the involved extremity but has difficulty with self-care activities		Individual cannot use the involved extremity for self-care or daily activities	

Impairment Determination for LE CRPS (Table 13-15, p.336, 553 – 5th Ed.)

- Rating is based on station and gait capability
- Based on ability to rise to standing position, walk, degree of difficulty with elevations, grades, stairs, deep chairs, walking long distances, need for assistance, mechanical support
- Does not apply to disorders based solely on subjective factors
- ***Be careful in evaluating use of a cane***!!!
- Other anatomical changes (musculoskeletal system??) are combined with gait effects, and other DRE diagnosis ratings but not peripheral nerve injuries, vascular effects, atrophy-p.526)

Table 13-15 Criteria for Rating Impairments Due to Station and Gait Disorders

Class 1 1%-9% Impairment of the Whole Person	Class 2 10%-19% Impairment of the Whole Person	Class 3 20%-39% Impairment of the Whole Person	Class 4 40%-60% Impairment of the Whole Person
Rises to standing position; walks, but has difficulty with elevations, grades, stairs, deep chairs, and long distances	Rises to standing position; walks some distance with difficulty and without assistance, but is limited to level surfaces	Rises and maintains standing position with difficulty; cannot walk without assistance	Cannot stand without help, mechanical support, and/or an assistive device

IMPAIRMENT RATINGS

6th Edition

Key Quotes from 6th Ed.

- "Since a subjective complaint of pain is the hallmark of this diagnosis, and since all of the associated physical signs and radiologic findings can be the result of ***disuse, an extensive differential diagnostic process is necessary***"

Key Quotes from 6th Ed.

- "Differential diagnoses that ***must*** be ruled out include…."
- A diagnosis of CRPS may be ***exluded*** in the presence of any of these conditions…"
- "This exclusion is necessary due to the general lack of scientific validity for the concept of CRPS, and due to the reported ***extreme rarity of CRPS (any of the differential would be far more probable)"***

"This exclusion is necessary due to the general lack of scientific validity for the concept of CRPS, and due to the reported ***extreme rarity of CRPS (any of the differential would be far more probable)"***

Key Quotes from 6th Ed.

- "Because accurate diagnosis of CRPS is difficult, the ***diagnostic approach should be conservative, and supported by objective findings"***
- "The diagnosis of CRPS has not been scientifically validated as representing a specific and discrete health condition…***the diagnostic process is itself unreliable…"***

Impairment Determination for UE/LE CRPS (p.452, 540 – 6th Ed.)

- Is CRPS a ratable diagnosis?
- Determine number of objective points
- Assess adjustment factors
- Average the grade modifiers
  - Fn. History, Physical Exam, Clinical
- Compare with the class per objective points (objective outweighs modifiers)
- Clinically, choose the grade in the class

TABLE 15-24

Diagnostic Criteria for Complex Regional Pain Syndrome

1) Continuing pain, which is disproportionate to any inciting event.
2) Must report at least 1 symptom in *3 of the 4* following categories: _____ Sensory: Reports of hyperesthesia and/or allodynia _____ Vasomotor: Reports of temperature asymmetry and/or skin color changes and/or skin color asymmetry _____ Sudomotor/Edema: Reports of edema and/or sweating changes and/or sweating asymmetry _____ Motor/Trophic: Reports of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin)
3) Must display at least 1 sign[a] at time of evaluation in *2 or more* of the following categories: _____ Sensory: Evidence of hyperalgesia (to pinprick) and/or allodynia (to light touch and/or deep somatic pressure and/or joint movement) _____ Vasomotor: Evidence of temperature asymmetry and/or skin color changes and/or asymmetry _____ Sudomotor/Edema: Evidence of edema and/or sweating changes and/or sweating asymmetry _____ Motor/Trophic: Evidence of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nail, skin)
4) There is no other diagnosis that better explains the signs and symptoms.
[a] A sign is counted only if it is observed and documented at time of the impairment evaluation.

TABLE 15-25

Objective Diagnostic Criteria Points for Complex Regional Pain Syndrome

Local clinical signs	Points
Vasomotor changes:	
• Skin color: mottled or cyanotic	1
• Skin temperature: cool	1
• Edema	1
Sudomotor changes	
• Skin dry or overly moist	1
Trophic changes:	
• Skin texture: smooth, nonelastic	1
• Soft tissue atrophy: especially digit tips	1
• Joint stiffness and decreased passive motion	1
• Nail changes: blemished, curved, talonlike	1
• Hair growth changes: fall out, longer, finer	1
Radiographic signs	
• Radiographs: trophic bone changes, osteoporosis	1
• Bone scan: findings consistent with CRPS	1

Note: CRPS indicates complex regional pain syndrome.

TABLE 15-26 Complex Regional Pain Syndrome (Type I): Upper Extremity Impairments

Complex Regional Pain Syndrome (UEI)

Note: Prior to using table, examiner must review Sections 15.1 and 15.5. The diagnosis of CRPS must be defined by Table 15-24, Diagnostic Criteria for Complex Regional Pain Syndrome, and specified points threshold must be met as defined by Table 15-25, Objective Diagnostic Criteria for Complex Regional Pain Syndrome. The default value for impairment is grade C and modified by reliable findings and use of adjustment grids.

DIAGNOSTIC CRITERIA (KEY FACTOR)	CLASS 0	CLASS 1	CLASS 2	CLASS 3	CLASS 4
IMPAIRMENT RANGES (UE %)	0% UE	1%–13% UE	14%–25% UE	26%–49% UE	50%–100% UE
OBJECTIVE FINDINGS (POINTS THRESHOLD)		≥4 points	≥6 points	≥8 points	≥8 points
SEVERITY		Mild	Moderate	Severe	Very severe
GRADE	0; CRPS diagnosis not supportable	A B C D E 1 3 7 11 13	A B C D E 14 17 20 23 25	A B C D E 26 32 38 44 49	A B C D E 50 60 70 80 90

Note: UE indicates upper extremity; CRPS, complex regional pain syndrome.

6th Ed. CRPS Ratings

- Functional History Modifier
  - UE: QuickDASH score
  - LE: Gait Derangement – Assistive Device
- Physical Exam Modifier
- Clinical Study Modifier

******But Objective signs are the KEY!!!!!******

My 2 Cents Worth!!

- CRPS is ***extremely rare*** (if there is such a thing)
- The system allows the diagnosis though to be rated IF the Budapest criteria are all met (including #4)
- The documentation in the records from the treating physicians is horrendous

My 2 Cents Worth!!

- The diagnosis is massively abused and overused—*largely based on subjective symptoms, not objective signs*
- Appropriate diagnosis leads to less harm and disability in the system
- Budapest criteria #4 (especially the forensic neuropsych eval) is rarely considered

My 2 Cents Worth!!

- A lot of these “legitimate patients” have a presentation of ***“dysautonomia”*** but not full-blown CRPS
  - I will treat them similarly to CRPS but really emphasize mobility and use of the extremity and continually re-emphasize “the fact they don’t have true CRPS is a good thing and has a much better prognosis!!!

2 “CRPS” Patients I’ll Never Forget

- “Boxing Glove Hand”
- “SCS Patient”

QUESTIONS??

Thank you!!