Inter-hospital rehabilitation meeting

S H Wah
Haven of Hope Hospital
19/06/2008

Case Presentation

- Madam Chan
- F/51, construction site worker
- In 2/2004, industrial accident , L shoulder hit by a heavy falling wood broad and pushed her against a wall
- causing R little finger crushed onto metal rod with #DP
- and noticed insidious onset of L shoulder pain.
- 2 Months after injury, FU at O& T clinic : R finger # healed . Persistent L shoulder pain, L upper limb pain and weakness.
- Limited L shoulder movement – Active ROM- abduction 90-100 degree, forward flexion 90 degrees, limited internal rotation (could not buckle up her bra at the back using L hand)

Jan 05 seen in Shoulder Clinic of O&T Dept

- Persistent L shoulder pain and reduced ROM
- Cervical spine x ray – Degenerative changes was seen with marginal osteophytes.
- Mild narrowing of multiple cervical intervertebral foramina.
- Private MRI (3/2005)- mild thickening with increased signal intensity in supraspinatus tendon suggestive of tendinosis. Minimal soft tissue thickening surrounding the L ACJ due to early OA change.

- Arthroscopy was done in June 05, findings:-
  - Type I SLAP (Superior Labrum Anterior Posterior Lesion.)
  - detachment lesion of the superior aspect of glenoid labrum; (Type 1- entirely posterior).
  - Bicep tendon, subscapularis intact, no rotator cuff tear
  - N Humeral head, mild thinning of glenoid articular surface
  - Rx : Arthroscopic debridement and acromioplasty.

  Post up AROM : L Shoulder abduction 70-90 degrees, forward flexion 90 degrees, external rotation 30 degrees, internal rotation 60 degrees.

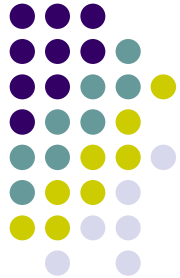
  Symptoms of Left upper limb persisted

  Referred for work rehab
- Low mood, insomnia --- referred for psychiatry assessment, Amitriptyline commenced for Dysthymia
- Refer pain clinic for chronic persistent L shoulder pain with much distress

Pain Clinic assessment Mar 06

- Symptoms after the injury :
  - Tightness, “pulling pain” at back of L shoulder and L axilla
  - Itchiness at medical 3 fingers of L hand, the L forearm, radiating to back of shoulder
  - Numbing discomfort at lateral aspect of L hand , very distressing and frequently waking up patient at night.
  - Increase sweating of L palm
  - Increase L eye lacrimation
  - Weakness of L UL

Pain intensity 7/10



- 4 grown up children, the eldest working
- Unemployed , still on sick leave from the last employer
- Husband quitted construction site worker job
- became night shift watchman to look after patient and for housework
- MAB scheduled in Feb/2006
- Primary school education
- Received DA

- Phy Exam:
  - L palm sweaty ++, L forearm slightly warmer then R side, and swollen
  - Tone normal , No gross muscle wasting
  - L UL proximal and distal power 3/5, *? Limited by pain*
  - Subjective reduction in touch and pin prick sensation over the whole L upper limb and L upper trunk
  - Diffuse tenderness over L UL muscles, L axilla and shoulder region
  - Biceps jerks – present and symmetrical
  - Triceps jerks – R present, L *cannot be elicited*.
  - Increase lacrimation and congestion of L eye

- Clinical Impression:
  - Complex Regional pain syndrome, Type I, after injury
  - ? L rotator cuff tear
- Treatment efficacy:
  - Doloxene 32mg, 20-30% of pain relief
  - Indocid 25mg, tds, good relief of pain ~50%, stopped
  - Naproxen 250mg TDS+ 20-30% of pain relief
  - TENS with short term effect
- Started Tegretol 200mg nocte
- Amitriptyline 100mg nocte (by psychiatry clinic for treatment of depression after pain onset)
- Pacing skills
- Refer acupuncture

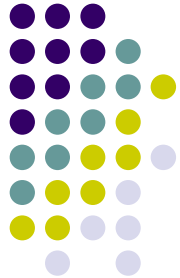
Pain Clinic follow up July 06

- Worst pain 6/10
- Numbness over L forearm
- with itchy sensation
- Relaxation technique taught by pain nurse
- Goal – resume work and change of job nature
- Instruct for regular exercise
- Brufen effective in reducing 50% of pain
- Off Tegretol, Add Epilim for pain control
- Injection of mixture of 2% lignocaine

- L stellate ganglion block on 25 Jan 2007
- 10ml of 0.5% Ropivacaine
- Post injection : L nostril stuffness, L conjunctiva congestion, UL temp 34.6 degree, R 31.5 C
- Pain – improve immediately and last for 10/7 pain score drop from 6/10 to 1/10
- Reduce sweating, numbness
- Sweating - improved for about 5 days
- Pruritis & itchiness , reduced by 30% and persisted for > 5 weeks
- LUL weakness persisted.

- Impression:+ ve trial of stellate ganglion block

Late 2007 to 2008



- Botox 50% given in July 2007, 100 units on 40+ sites on L palm by insulin needle
- with improvement in L palm hyperhydrosis, less need to wipe palm

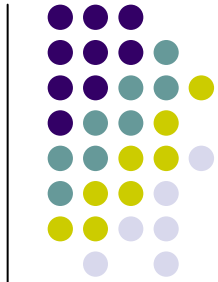
- Had taut band injection to 1/. L infra-spinatous and Lat. dorsi in 7/06 ,and 2/. L Pectoralis major 6/07

- Main complaints:- Pain in L Trapezius and tightness radiating to L side of neck and head
- -L anterior shoulder pain
- Pain from 7/8 to 5/6 out of 10
- -Medical fingers numbing sensation / itchy discomfort same
- -Numbness that frequently waked her up at 2AM

- MAB 10% PD (9 Aug 07) , Legal Aid approved , pending for appeal

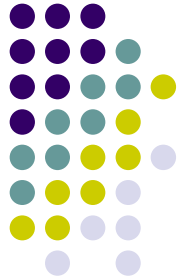
- *Discussion*

Complex Regional Pain Syndrome



- History
- Diagnostic Criteria
- Epidemiology
- Patho-physiology
- Sign and symptom
- Diagnostic tests
- Clinical courses and prognosis
- Mx approach : Pharmacotherapy, psychotherapy, PT
- Rehabilitation; CBT
- Advances and EBM Pharmacotherapy
- Intervention therapy
- Surgical therapy
- Advances and Novel therapy

Complex Regional Pain Syndrome



- CRPS is a debilitating neurological syndrome characterized by
  Pain and hypersensitivity
  Vasomotor skin changes
  Functional impairment
  Various degrees of trophic change
  CRPS generally follows a musculoskeletal trauma

  CRPS I = RSD
  CRPS II = causalgia (involves nerve injury)

History

- In 1864, Silas Weir Mitchell reported that gunshot wounds and other injuries of peripheral nerves causes pain in limbs. Its intensity varies from the most trivial burning to a state of torture.
- "…..becomes exquisitely hyperaesthetic, a tap to the limb triggers pain."
- In the beginning of Twentieth Century ,in 1901 , Paul Sudeck, a surgeon in Hamburg, Germany published a paper about post traumatic dystrophy.
- He described a post-traumatic pain syndrome with oedema and trophic changes. As the sympathetic nervous system seems to be over-active at the , the term "Sympathetic Reflex Dystrophy" was introduced and used for many years. The term Causalgia was in fact 1st introduced by Mitchell in 1867.
- Relief of pain w sympathetic blockade were sometimes reported but not invariably effective.
- The terminology and diagnostic criteria were confusing and the term sympathetic was increasingly felt to be inaccurate
- A consensus meeting was held in 1994 by the International Association for the Study of Pain IASP in which a specific criteria was developed.

Epidemiology

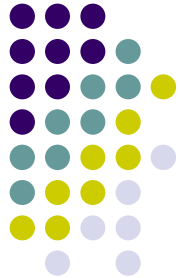
- More women then men (60-81%); 2.3 to 3 times more frequent in females than males
- Mean age ranges from 36-42 on dx
- Mean age at time of injury 37.7 years
- Mean duration of symptoms before pain center evaluation ~30 months
- 5%, bilateral
- Upper extremity (44-61%)is affected more often as the lower extremity(39-51%)
- Rarely seen in patients younger than 10 or older than 70
- Children have more Lower extremity involvement

- Incidence
  - 1 per 5000 persons per year (Germany data)
  - In Sweden , population of 8.6M, annual incidence of RSD+Causalgia ~80-110 in the 90s (hospitalization)
  - For *pain in an extremity* 1300-2000

  - 1%- 28% following peripheral nerve injury and 1.5- 28% after stroke
  - Colles# or tibial shaft # up to 28%- 37%

  - From literature review 6-24% idiopathic
  - 16 % after a fracture
  - ¼ asso. Trauma (10-29% after a sprain)

Pathophysiology

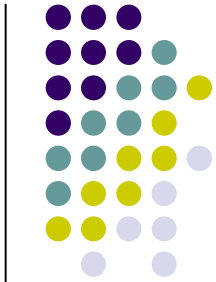


- Underlying mechanism was unknown
- Proposed that multiple components playing roles in generation and maintenance of CRPS
- One proposed theory was **sympathetic dysfunction**
- increased afferent nerve of activity at the site of injury
- induces an abnormally increased rate of efferent sympathetic nerve impulses towards the involved extremity
- causing vasomotor, sudomotor and temperature changes, in turn exacerbate the pain
- Sympathetic Hyperactivity
  - clinical evidence of sympathetic hyperactivity in CRPS patients (hyperhydrosis, vasoconstriction)
  - however, experimental evidence for increased sympathetic efferent activity is equivocal

Neurogenic inflammation

- At a critical level of excitation of the sensory afferent nerve fiber at the axonal level
- releases certain neuropeptide include : substance P, neuropeptide Y, calcitonin gene related peptide
- this in turn induced vasodilatation, increase the permeability ,erythema and stimulate more sensory nerve fiber
- results in an inflammatory response,
- lowers the pain threshold
- this mechanism termed neurogenic inflammation

Diagnoses and clinical pictures



- Spontaneous pain is common usually described as dull ache, deep seated ,burning, pricking, throbbing, shooting.
- - orthostatic exaggeration, decreasing with limb elevation
- - Pain ppt by light touch, moving , vibration, mild thermal stimulation , even with low TENS
- Allodynia: pain from a stimulus that does not normally provoke pain Allodynia is observed in 8% to 41%
- **Hyperalgesia**: excessive sensitivity to pain
  - Hyperalgesia was noted almost in 100%
- most commonly associated with mechanical impacts [pinprick].
- Central sensitization which may relate to motion dependent amplification.
- Spread of Hyperalgesia may go beyond the initial site of injury.
- Also ***thermal Hyperalgesia*** ,more commonly seen in association with peripheral sensitization
- Numbness/Paresthesia
- Foreign feeling of the limb was reported in up to 30 percent of cases

- **Checklist for Diagnosis: History**

  Skin, sensitivity to touch, to cold
  Abnormal swelling
  Abnormal hair growth ,nail growth
- Abnormal sweating
  Abnormal skin color changes ,temperature changes,
  Limited movement

  Checklist for Diagnosis: Examination

  Mechanical allodynia
  Hyperalgesia to single pinprick
  Cold allodynia
  Abnormal swelling
  Abnormal hair, nail growth
  Abnormal skin color changes, temperature
  Limited range of movement
  Motor neglect

- **Bogduk N. Current Opinions in Anesthesiology. 2000;14:541-546**

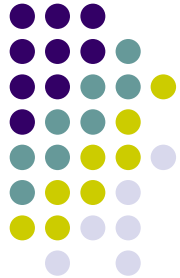
- Signs
  - Hyperalgesia to heart cold, and mechanical stimuli, Mechanical hyperalgesia is almost always present with dolorimerty
  - Thermal hyperalgesia is identified in less than half
  - Skin blood flow is usually abnormal at some point during the disease. Side to side temp diff. are usually > 2.5 degreeC
  - An abnormal sweat response ,
  - Edema is present in most

Differential Diagnoses

Diabetic and small-fiber peripheral neuropathies
Entrapment neuropathies
Thoracic outlet syndrome
Discogenic disease
Deep vein thrombosis
Cellulitis
Vascular insufficiency
Lymphedema
Erythromelalgia

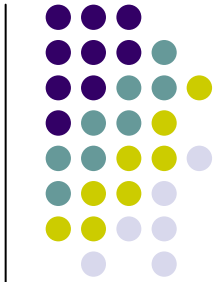
- **Raja SN et al. Anesthesiology. 2002;96:1254-1260**

Autonomic vasomotor changes



- Up to 81% distal oedema during acute stage
- 80 percent has a temperature difference with the contraletral hand for more than one degree C by infrared thermography
- Color changes: in first month usually red and hot; later Bluish and cold
- Increase sweating was detected ~`50 percent of cases with increase production or abnormal sweating

Motor disturbance



- Weakness 77%
- Tremor 24 to 60%
- Myofascial dysfunction 56-61%
- Decreased range of movement (in acute stage due to oedema, contracture or fibrosis in chronic state)
- Myoclonus or local dystonia may occur in up to 30%
- Up to a 45 percent of cases may have exaggerated tendon reflexes

- *Diagnostic Approach*

Diagnostic Approach

- CRPS is primarily a clinical diagnosis it is not associated with raised E S R, no relation to antibody titer, no evidence of autoimmune disorder, no fever or leukocytosis.
- Response to a sympathetic blockade is no longer useful in diagnosis.
- **Clinical Exam is the Gold Standard**
  - Based on Criteria, i.e. IASP criteria

- ***Diagnostic Testing:-***
- A./ pain threshold evaluation
- B./autonomic control evaluation , e.g.. Quantitative autonomic testing
- C./ Diagnostic sympatholytic intervention, ? Sympathetically maintained pain SMP
- D./Diagnostic imaging : X-ray, Radionuclide Bone Scan,

Diagnostic criteria

TABLE 1.

IASP Diagnostic Criteria for Complex Regional Pain Syndrome I (IASP/CRPS)

1. The presence of an initiating noxious event, or a cause of immobilization
2. Continuing pain, allodynia, or hyperalgesia with which the pain is disproportionate to any inciting event
3. Evidence at some time of edema, changes in skin blood flow, or abnormal sudomotor activity in the region of pain
4. This diagnosis is excluded by the existence of conditions that would otherwise account for the degree of pain and dysfunction

Table 3 Proposed clinical diagnostic criteria for CRPS

General definition of the syndrome:
CRPS describes an array of painful conditions that are characterized by a continuing (spontaneous and/or evoked) regional pain that is seemingly disproportionate in time or degree to the usual course of any known trauma or other lesion. The pain is regional (not in a specific nerve territory or dermatome) and usually has a distal predominance of abnormal sensory, motor, sudomotor, vasomotor, and/or trophic findings. The syndrome shows variable progression over time.

To make the *clinical* diagnosis, the following criteria must be met:

1. Continuing pain, which is disproportionate to any inciting event.
2. Must report at least one symptom in *three of the four* 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 one sign **at time of evaluation** in *two or more* of the following categories:
   Sensory: Evidence of hyperalgesia (to pinprick) and/or allodynia (to light touch and/or temperature sensation and/or deep somatic pressure and/or joint movement)
   Vasomotor: Evidence of temperature asymmetry (>1°C) 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.

For *research* purposes, diagnostic decision rule should be at least one symptom *in all four* symptom categories and at least one sign (observed at evaluation) in two or more sign categories.

Table 4 Summary of decision rules considered (modified from [12])

Criteria/Decision Rules for Proposed Criteria	Sensitivity	Specificity
2+ sign categories & 2+ symptom categories	0.94	0.36
2+ sign categories & 3+ symptom categories	0.85	0.69
2+ sign categories & 4 symptom categories	0.70	0.94
3+ sign categories & 2+ symptom categories	0.76	0.81
3+ sign categories & 3+ symptom categories	0.70	0.83
3+ sign categories & 4 symptom categories	0.86	0.75

Diagnostic tools

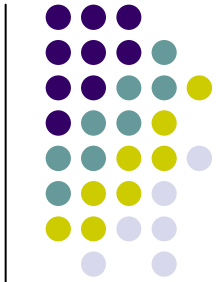
- Von Prey or Semmes-Weinstein monofilament to quantify the pain threshold, for monitoring

- Dolorimerty
  - Joint tenderness quantitative measurement
  - pressure measurement device called a dolorimeter or algometer.
  - The specificity is 95% in asymptomatic subjects,
  - Sensitivity of 100% in UL, 92 % in LL recent fracture

Diagnostic testing

- Skin temperature can be measured by Doppler Flowmetry, or infrared thermography,
- sweat output can be assessed by quantitative sudomotor axon reflex testing. QSART
- Cutaneous blood flow can be measured by vital capillaroscopy.
- Muscle atrophy can be measured by EMG .

Quantitative Autonomic Testing



- Skin temperature can be measured by :--
- 1).Infrared thermography and video thermography
  - Sensitivity and specificity are low

- 2).Doppler flowmetry to measure skin blood flow
  - Again lacks specificity and correlation to symptom severity

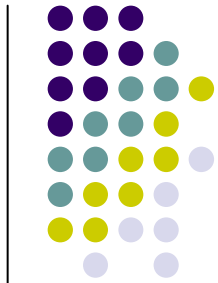
- The cold stressor test
  - skin temperature drop after immersion in 15C to 20 degreeC water for 1 minute
  - To observe for prolonged reduced temp
  - not a specific finding

Quantitative Autonomic Testing

- The sympathetic skin response test has a 63% sensitivity
- Sudmotor evaluation is performed by recording resting sweat output by quantitative sudomotor axon reflex test (QSART).
- QSART has the highest specificity (58%) of all autonomic test
- Skin temperature may be recorded with infrared telethermography at up to 14 sites bilaterally.
- Skin temperature had the highest sensitivity (62%)

- Combinations of these three laboratory tests give a 100% sensitivity and 77% specificity for the diagnosis of CRPS, compared to clinical diagnostic criteria for cases of CRPS

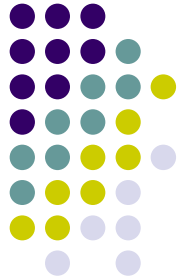
Diagnostic sympatholytic intervention



- Sympathetic ganglion block with local anesthetics---into Stellate or lumber paravertebral ganglia; usually a 50% reduction of pain is indicative of presence of SMP
- Intravenous regional block with Guanethidine; a brief pain and followed by days of relief indicate SMP
- Phentolamine test: IV infusion of Phentolamine with demonstration of 50% reduction on VAS pain score indicates SMP

- Sympathetic Ganglion Blocks with Local Anesthetics
  - Lumbar or stellate paravertebral sympathetic ganglia
  - Skin temperature significantly increases
  - (To > or equals to 35 degreeC in some centre)
  - 50% reduction of pain indicates SMP
  - Randomized blinded saline injection to be given to minimize false +ve due to placebo effect

Intravenous regional Block



- Guanethidine intravenous Regional Blocks
  - Intravenous line placed distally
  - Suprasystolic cuff to 50-100mm Hg above systolic pressure to deplete norepinephrine in postganglionic axon,
  - Guanetidine was infused with a local anesthetic or saline solution.
  - cuff was released 15 to 30 minutes later
  - cause a brief pain,
  - days of symptom relief indicate SMP
  - Agents used :Reserpine, lidocaine and corticosteroid, ketorolac, bretylium,
- Phentolamine test
  - Phentolamine, an α1, α2 adrenergic antagonist,
  - infused intravenously ,
  - 50% reduction of spontaneous pain by VAS indicates SMP

Diagnostic tools

- X-ray:-
- regional osteoporosis , patchy bony demineralization at the periarticular surface may appear within 3 weeks
- Subperiosteal bone resorption with ground-glass appearance
- Approximately 1/2 of the patient may have X ray changes
- As similar changes may occur in any disused limbs, therefore not specific

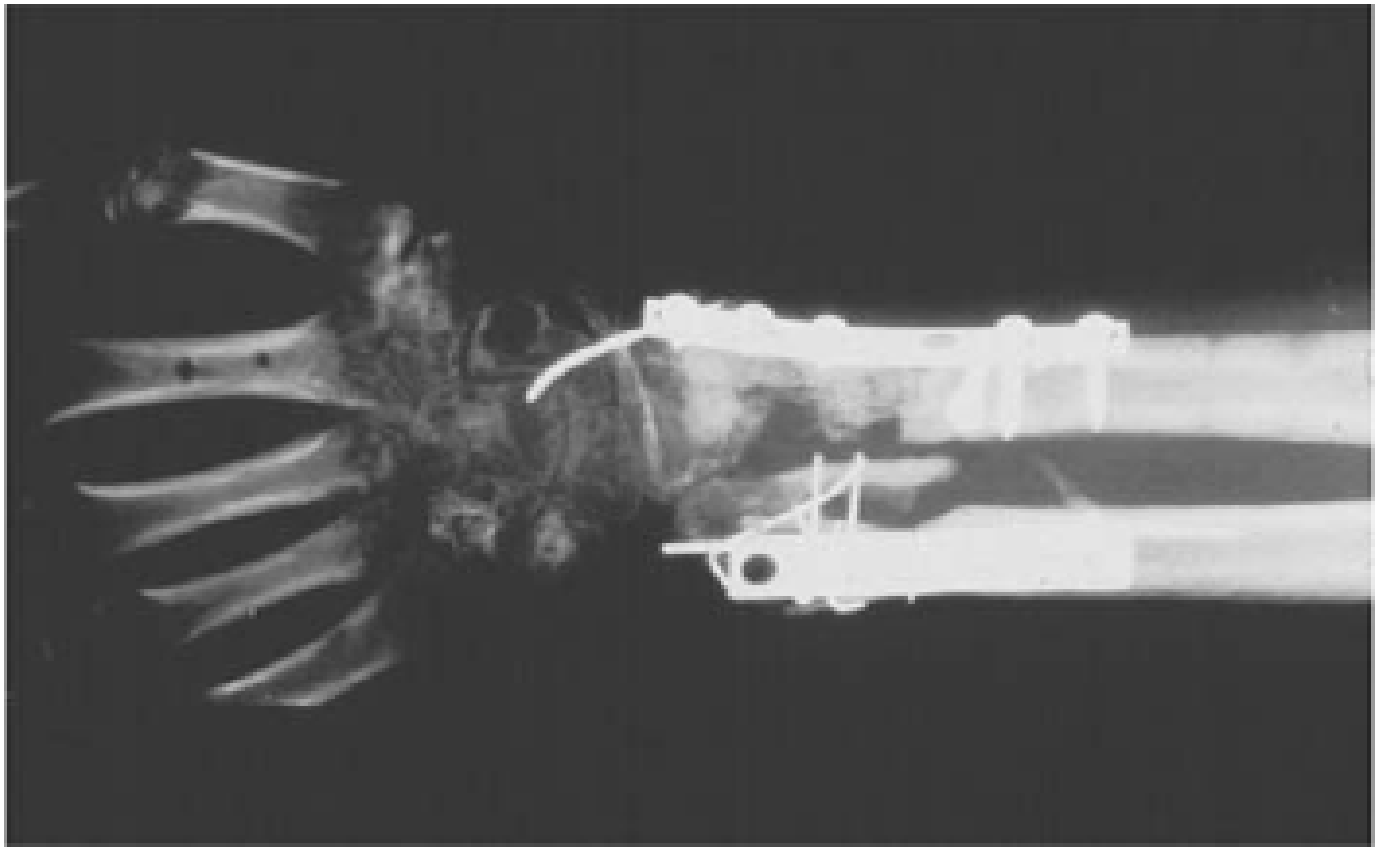
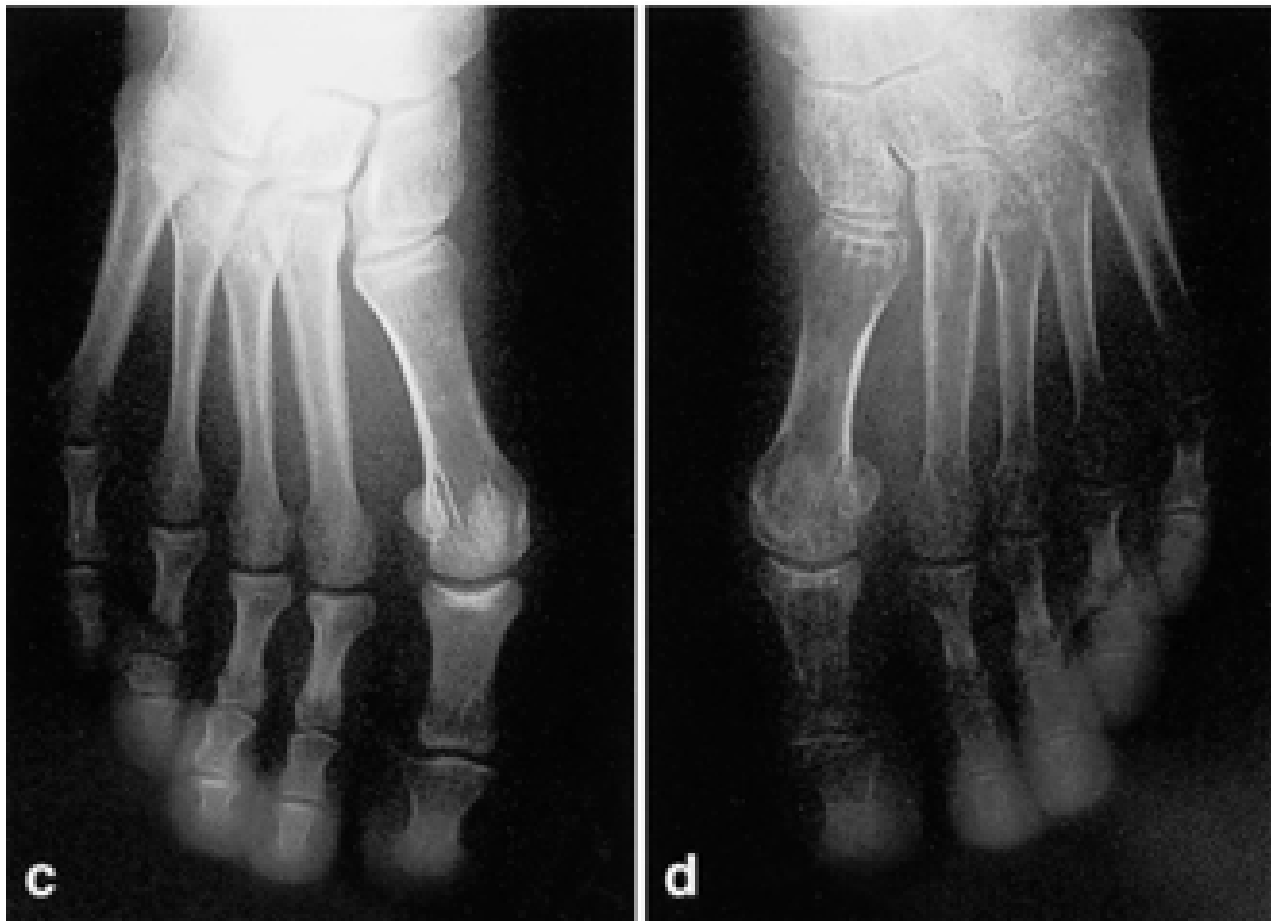


Fig. 2 This is a typical radiograph finding with spotty osteoporosis, which is pronounced in the metaphysal segments of bones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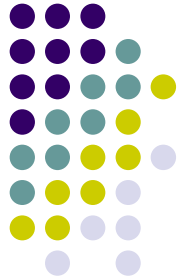
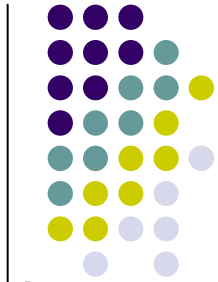
Tri-phasic bone scan

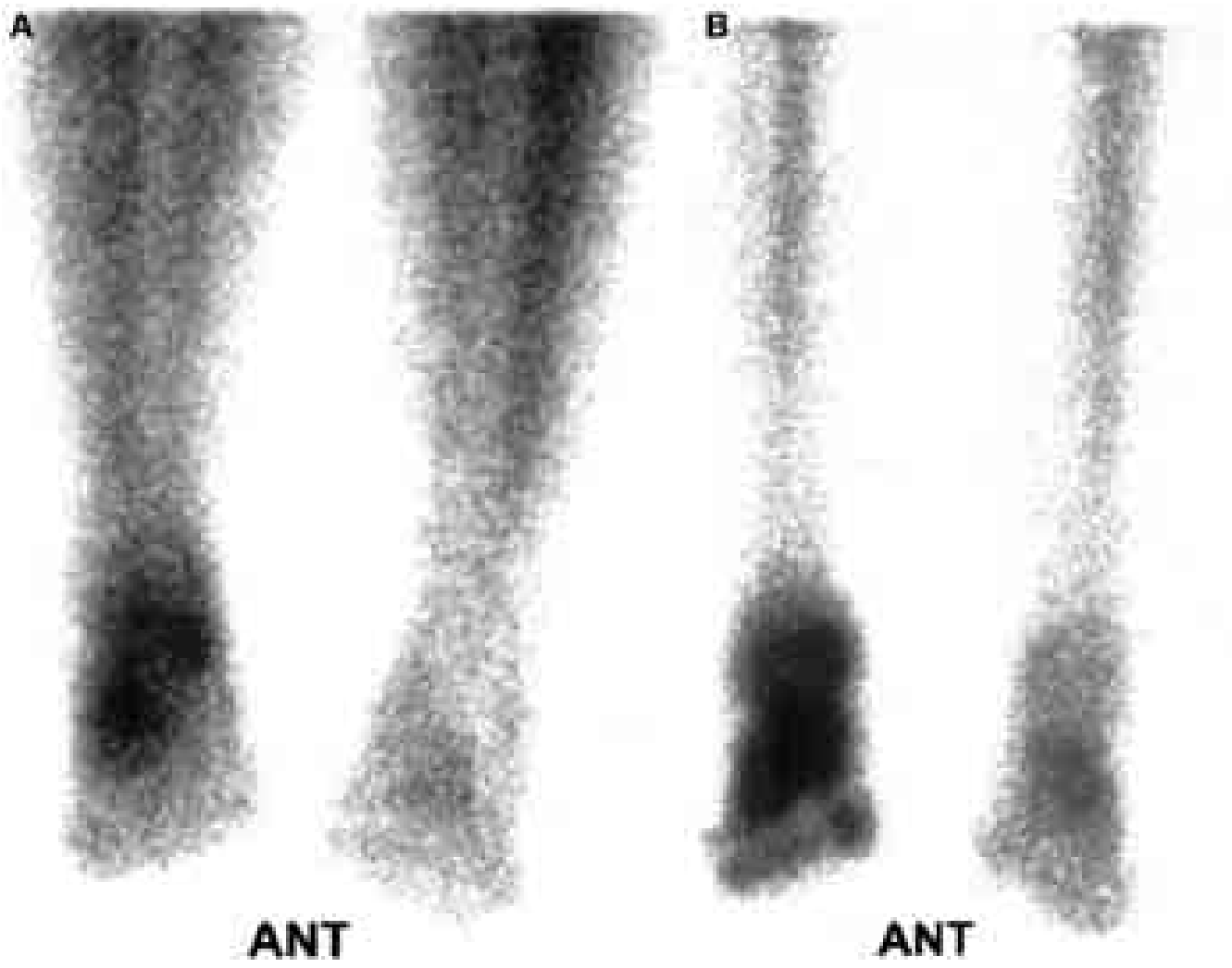


- Radionuclide Bone Scans
  - Tri-phasic bone scan
  - with injection of Technetium 99m-labeled radioisotope with images obtained immediately, 10 minutes, and 2 hours after injection
  - Early scan: diffuse asymmetrical uptake
  - Delayed; periarticular tracer accumulation

Tri-phasic bone scan



- The role of bone scan in C R PS is to support or to confirm the diagnosis, particularly **to exclude** other diagnoses such as arthritis, malignant bony lesions or even a metabolic bone disease.
- Sensitivity and specificity of tri-phasic bone scan varies.
- 86% sensitivity, only 60% specificity compared to clinical diagnosis.
- Specificity of the tri-phase bone scan in asymptomatic limbs is up to 77%
- Holder found a sensitivity of 100% and the specificity of 80% for C R P S type I .
- In another series ;sensitivity of 25 percent in stage I CRPS , 85% in stage II ,and 100% in stage three.
- However the scan finding was not useful for treatment monitoring.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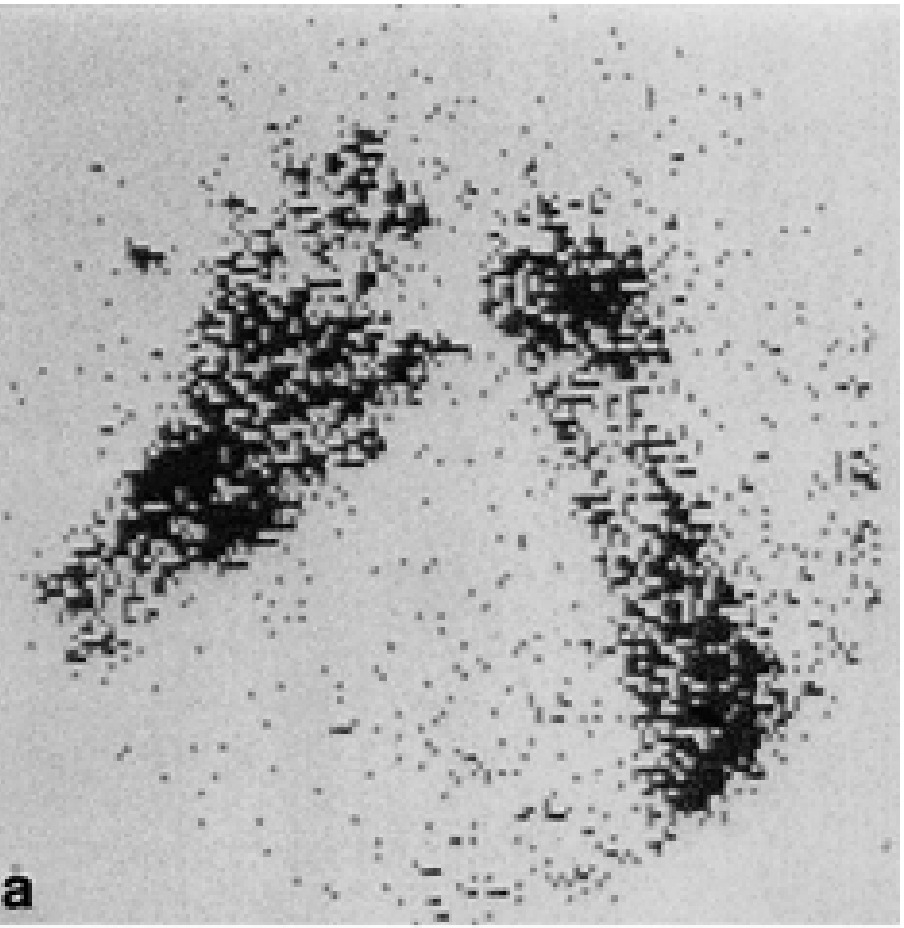
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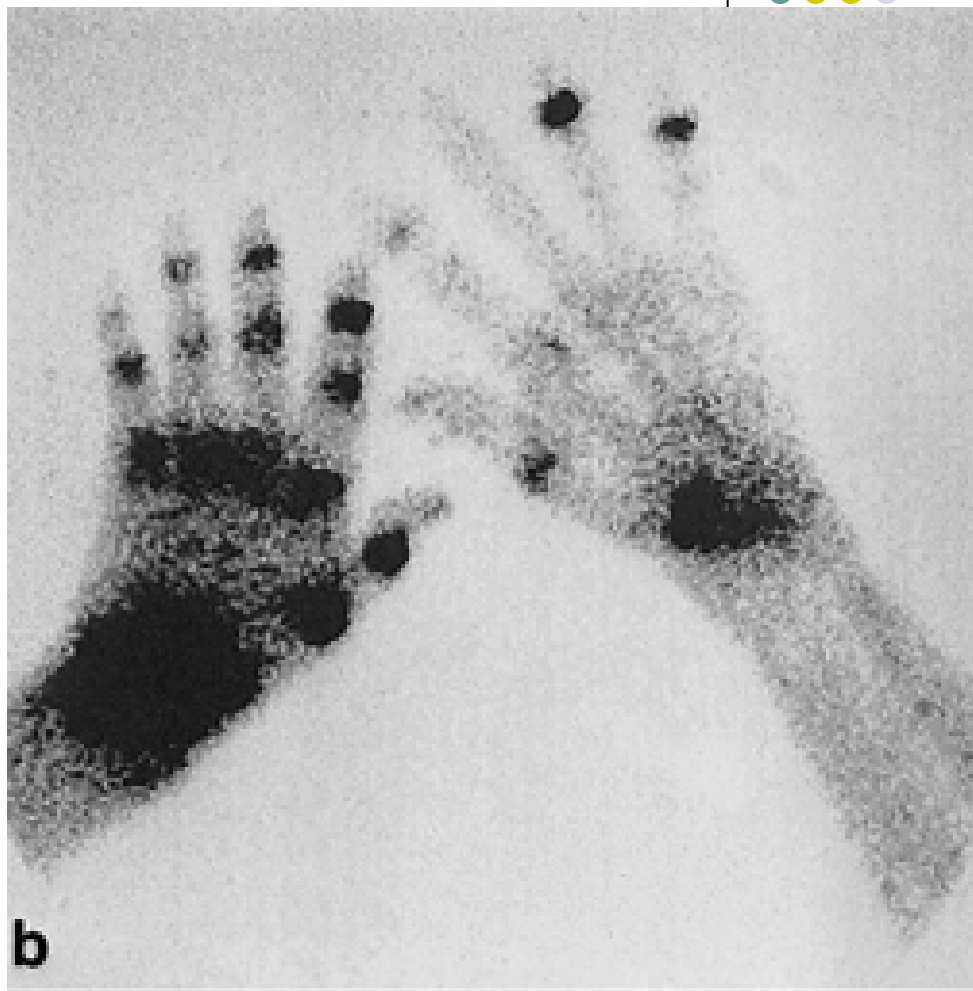
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- Numerous experimental studies demonstrated changes in regional cerebral blood flow rC B F in both acute and chronic pain.
- Single photon emission tomography S P E C T , positron emission tomography P E T, and MRI are studied in all types of chronic pain syndrome.
- increases in rC B F on brain S P E C T noted in patients with central post-Stroke pain at the thalamus contraletral to the side of painful limb
- In the cases of C R P S, increase in the contraletral thalamic activity on brain S P E C T has been described after electro-convulsive therapy.
- The role of S P E C T is not well established

Clinical courses

- It is commonly divided into three stages: the first is referred as **acute stage** ,lasts 3 to 6 months, the affected area is painful, tender, swollen, warm, accompanied by discoloration and acceleration of hair and nail growth

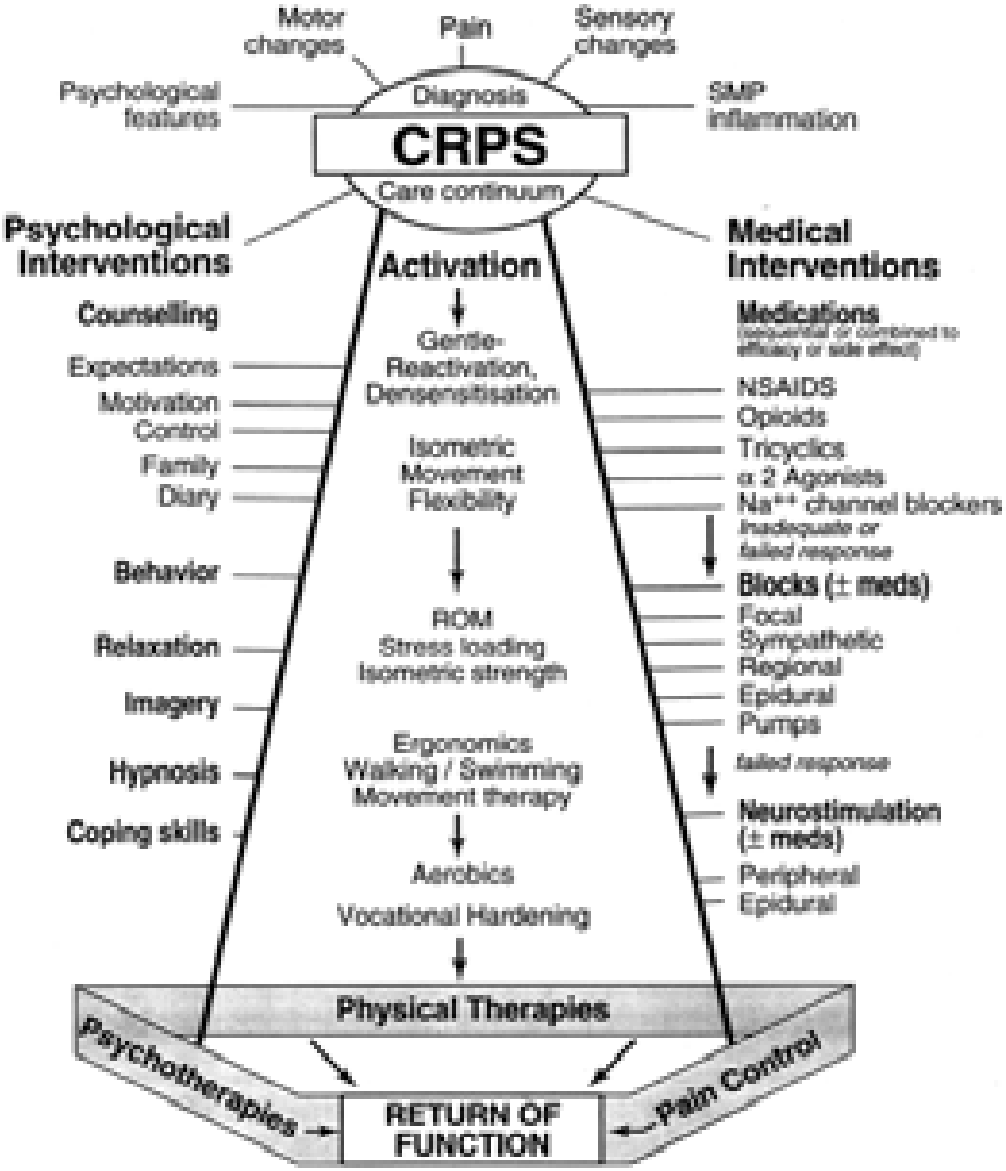
- In second stage ,“ **dystrophic” stage** lasting another 3 to 6 months, it is characterized by burning pain, exaggerated by tap, pallor, coolness of skin, hair loss, dystrophic skin changes such as pallor, cyanosis, brittle or crack nails. trophic changes appearing in the bones

- In the third stage, ‘**atrophic’ stage** ,which is permanent. included muscle atrophy, marked skin and bone atrophy ,contracture ,fibrosis and limited range of motion. The atrophic stages are at least in part secondary to loss of nutritional blood supply to the affected tissues.

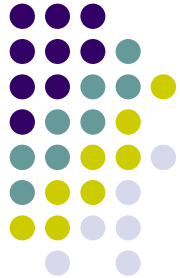
- Prognosis
  - Variable
  - In mild CRPS type 1 , 86% to 93% of these CRPS patients having spontaneous resolution of their pain within a year

  - Prognosis for the chronic CRPS patient is poor only less than 10% reporting resolution 4 to 18 years after onset.

- *Treatment*

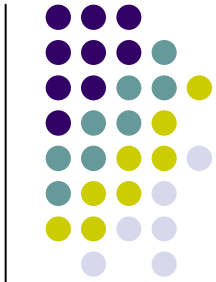

Motor changes
Pain
Sensory changes
Psychological features
Diagnosis
SMP inflammation
CRPS
Care continuum
Psychological Interventions
Activation
Medical Interventions
Counselling
Expectations
Motivation
Control
Family
Diary
Behavior
Relaxation
Imagery
Hypnosis
Coping skills
Gentle-Reactivation, Desensitisation
Isometric Movement Flexibility
ROM
Stress loading
Isometric strength
Ergonomics
Walking / Swimming
Movement therapy
Aerobics
Vocational Hardening
Medications
(sequential or combined to efficacy or side effect)
NSAIDS
Opioids
Tricyclics
α 2 Agonists
Na++ channel blockers
Inadequate or failed response
Blocks (± meds)
Focal
Sympathetic
Regional
Epidural
Pumps
failed response
Neurostimulation (± meds)
Peripheral
Epidural
Physical Therapies
Psychotherapies
RETURN OF FUNCTION
Pain Control

Rehabilitation

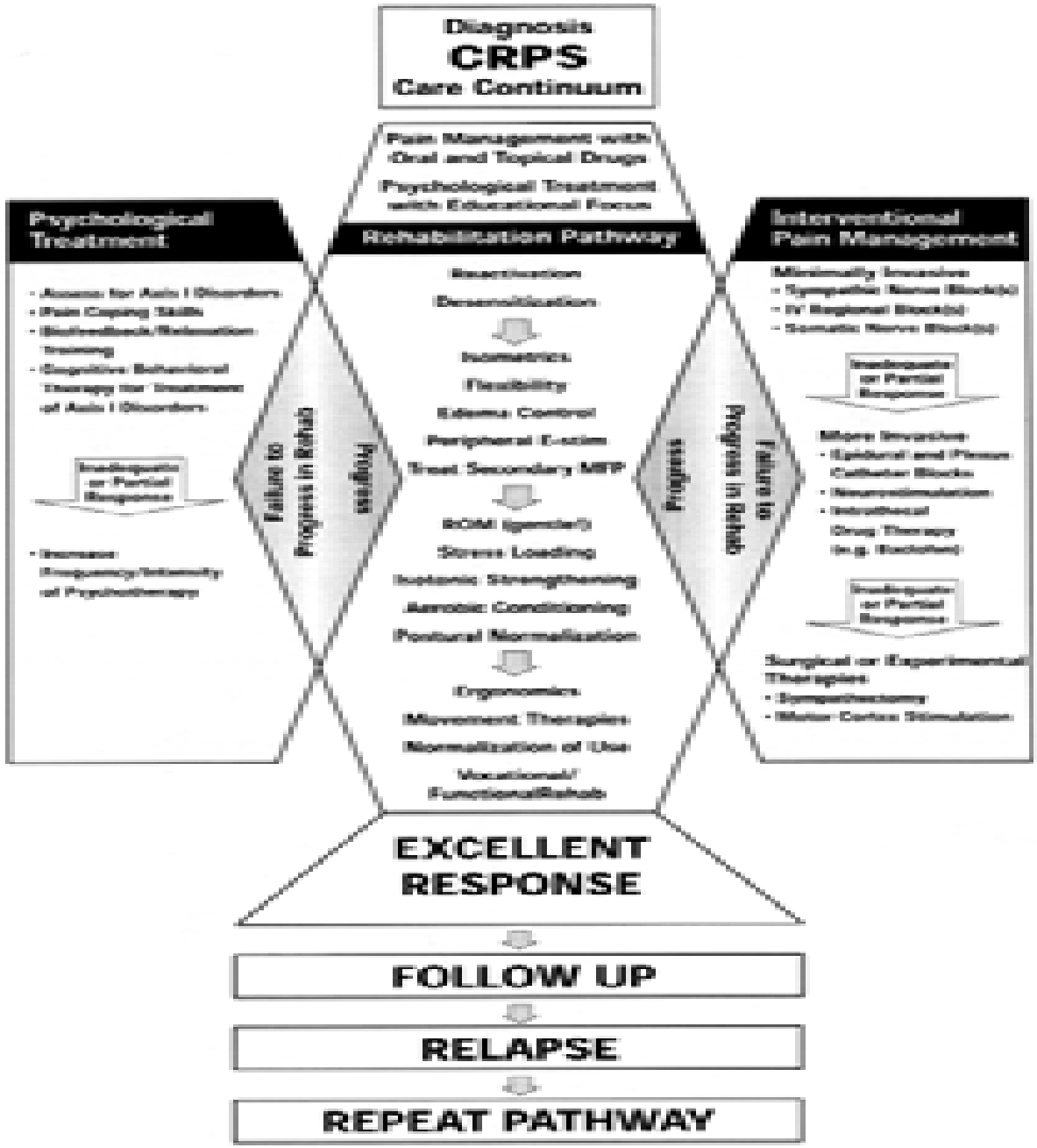


- Rehabilitation is the mainstay of Mx of CRPS
- The objective of therapy is help patient to mobilize the involved limb and
- Involved utilization of ***physical modalities*** for desensitization of the affected region, oedema control
- Concurrent PT, OT ,pharmacotherapy and psychological intervention aim to sequential progress through the steps of rehabilitation pathway to gradually increase patient's flexibility
- Successive steps to improve range of movement by training, stress loading, stretching , isotonic and isometric strengthening, aerobic conditioning and postural normalization
- By coordinated ***multi-disciplinary team approach*** intervention to keep up the patient's motivation ,engagement of activities , skill acquisition and maintenance.
- Learning to set goal , encourage activity, education of the disease progress and adequate use of medication
-

Rehabilitation



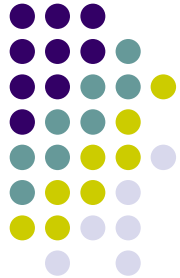
- may also involve home and workplace modification and or vocational rehabilitation ,functional rehabilitation and complimentary recreational therapy
- Family members are also included as the team member of management
- failure progression may imply stronger analgesia, intensive psychotherapy, or use of more aggressive pain Mx techniques including interventional modality --- hence communication among team members important, interval case conference beneficial


Diagnosis
CRPS
Care Continuum
Pain Management with Oral and Topical Drugs
Psychological Treatment with Educational Focus
Psychological Treatment
Rehabilitation Pathway
Interventional Pain Management
Failure to Progress in Rehab
Progress
Progress
Failure to Progress in Rehab
Inadequate or Partial Response
Inadequate or Partial Response
EXCELLENT RESPONSE
FOLLOW UP
RELAPSE
REPEAT PATHWAY

Modalities in physical therapy

- ……

Psychological therapy



- A critical component of multidisciplinary therapy of CRPS .The objective is to develop coping skill, to improve quality of life by
- For subacute cases for pain lasting more than eight weeks an early clinical psychological assessment was recommended
- Information of the diagnoses of C R P S was given, skills like goal setting, stress management, cognitive restructuring were taught
- Since family members may interfere with rehabilitation from knee members should be incorporated into training sessions to reinforce goal of reactivation.
- Cognitive behavioral therapy
- Group psychotherapy
- Symptom-specific psychotherapy:-- Biofeedback, Hypnosis

- ?Graded imagery therapy

- **Pharmacologic Pain Management**

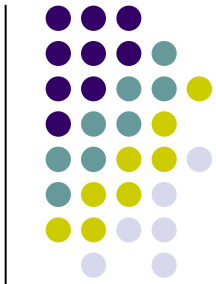
No “gold standard” treatment for CRPS

- Anti-inflammatory drugs, NSAID
- Tricyclic antidepressants TCA
  Anti convulsant: Carbamazepine, Valproate
- Opioid
- Topical agents :aspirin, Clonidine, Topical dimethyl sulfoxide DMSO
- IV Ketamine
  Clonidine
  IV Bretylium
  IV ketanserin
  IV Phentolamine
  IV and topical lignocaine
- Intranasal calcitonin
  Bisphosphonte:-IV alendronate

Interventional therapy

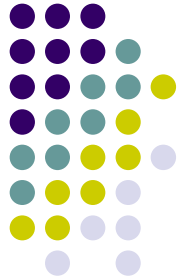
- Sympathetic ganglion blocks with local anesthetics
  - Intravenous regional sympathetic blocks
  - Peripheral nerve block with local anesthetics
  - epidural anesthetic block
- Chemical sympathectomy
- Surgical sympathectomy

Epidural Anesthetic Block



- Indwelling epidural catheter continuously infusing local anesthetic or opioid
- For long term blockade
- Used for CRPS of LL of the knee
- the infusion can be continued for as long as 7 days.
- Dosage titrated and patient allowed for pain free ambulation.

Surgery Sympathectomy

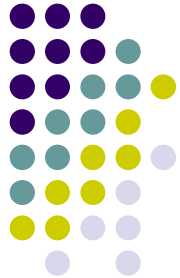


- civilian studies claimed 61% to 74% success rates
- No patient with symptoms for more than 12 months had reported complete relief in most series
- The response of SGB was predictive of the long term surgical outcome
- radiofrequency sympatholysis is a less invasive alternative
- Endoscopic sympathectomy vs. open surgery

- The most commonly reported complication: transient sympathetic neuralgia

Surgical Sympathectomy for reflex sympathetic dystrophy syndromes

by Dennis , J.of Vascular surg 2002



- 73 patients with RSD underwent 46 video-assisted thoracoscopic or 37 surgical lumbar sympathetic chain resections. The mean duration of the RSD symptoms before sympathectomy was 26±14 months.
- Result : transient (<3-month) post-procedural sympathalgia developed in one third of the patients for cervicodorsal sympathectomy and 20% of the patients for lumbar sympathectomy , treated effectively with trigger point/proximal ganglion block .
- At 3 months, 10% were judged treatment failures.
- The remaining patients testified to more than 50% pain reduction, pain severity scores decreasing from 8.7 before surgery to 3.4 after.
- At 1 yr. ¼ of the patients had continued significant pain relief (pain severity score, < 3). Overall, patient satisfaction was 77%.
- Conclusion : patients w RSD with a confirmed SMP realize long-term benefit from surgical sympathectomy. a low incidence rate of 7% of “new” complex regional pain after sympathectomy

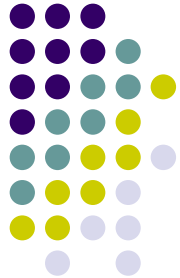
Chemical Sympathectomy for Neuropathic Pain Does it Work ? Case Report and Systematic Literature Review

Andrea The clinical Journal of Pain , 17:327-336, 2001

- Search Strategy : The Cochrane Database of Systematic reviews , Medline and EMBASE
- The case series reported partial ,temporary relief of pain primarily related to the modulation of allodynia but not to deep pain or pinprick hyperalgesia.
- **44%** of patients out of 13 studies experienced **meaningful pain relief**, 19% had no change, and remaining 37% of the patients equivocal. ***No conclusions*** regarding duration and degree of relief could be drawn due to poor reporting of the outcomes.
- Conclusion : chemical sympathectomy seems to have, at best, a ***temporary*** effect limited to cutaneous allodynia. Despite the popularity of chemical sympatholysis only few patients and poorly defined outcomes were reported in the literature, substantiating the need for well-designed studies on effectiveness of this procedure.

Therapeutic Role of Local anesthetic Sympathetic Blockade : A Narrative and Systematic Review

The Clinical Journal of Pain p216-233; 2002 Cepeda et al



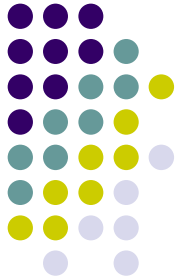
- Design : systematic review, local anesthetic sympathetic blockade used in published report or series with at least 10 patients

- Results : twenty-nine studies were included that evaluated 1144patients.19 studies were retrospective . The quality of the publications was generally poor. 29% of patient had full response, 41% had partial response, and 32% had absent response. The duration of pain relief was not studied in this review .

- Conclusions: This review raises questions as to the efficacy of local anesthetic sympathetic blockade. Its efficacy is based mainly on case series and less than 1/3 of cases in the series reported full pain relief. The placebo effect was not excluded. The absence of control groups leads to an overestimation of the treatment response

Local anesthetic sympathetic blockade for CRPS

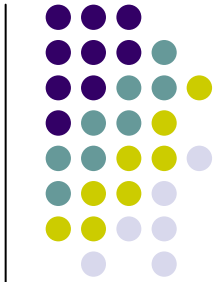
Cepeda Vol 2, 2008, The Cochrane Database of Systematic reviews



- Objective
  - To determine the likelihood of pain alleviation after sympathetic blockade with local anesthetics
  - To assess how long any benefit persists,
  - To evaluate the incidence of adverse effects of the procedure.
- The outcomes of interest were the no. of patients who obtained at least 50% of pain relief shortly after sympathetic blockade (30 minutes to 2 hours) and 48 hours or later.

- Results : - two small randomized double blind cross over studies what evaluated 23 subjects were found. Effect of the trials produced a relative risk (RR) of 1.17 (95% c1 0.80-1.72) to achieve at least 50% of pain relief after the sympathetic blockade
- Conclusions : revealed the scarcity of published evidence to support the use of local anesthetic sympathetic blockade as the “Gold standard” of CRPS treatment . No conclusion concerning the effectiveness of this procedure can be made.

Miscellaneous therapeutic options



- Mirror therapy
- Epidural drug administration
- Intra-theca medication delivery
- Spinal cord stimulation
- Repetitive trans-cranial magnetic stimulation
- Hyperbaric O2
- IV iloprost infusion
- IVIG

A controlled pilot study of the utility of mirror visual feedback in the treatment of complex regional pain syndrome (type 1)

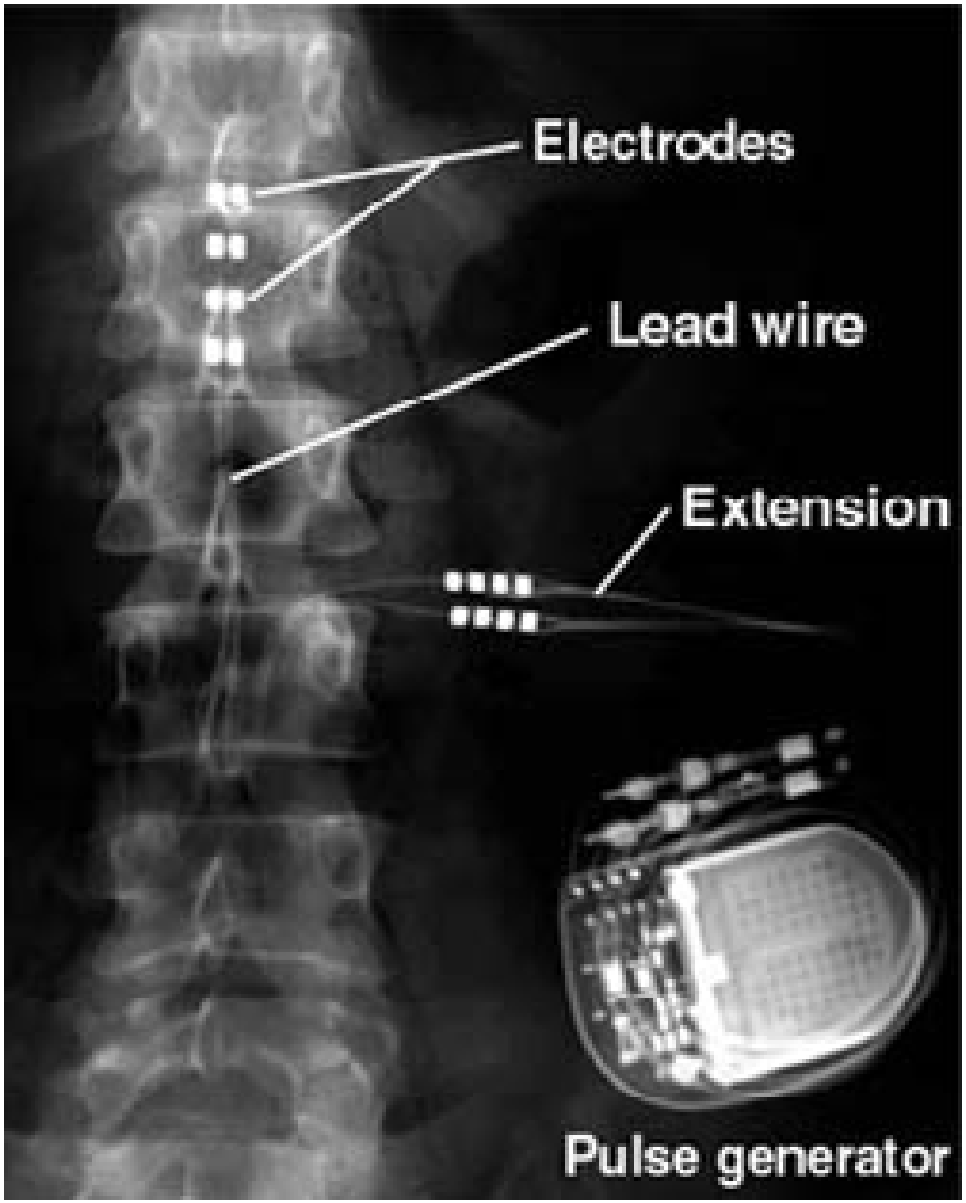
Rheumatology 2003, 42:97-101

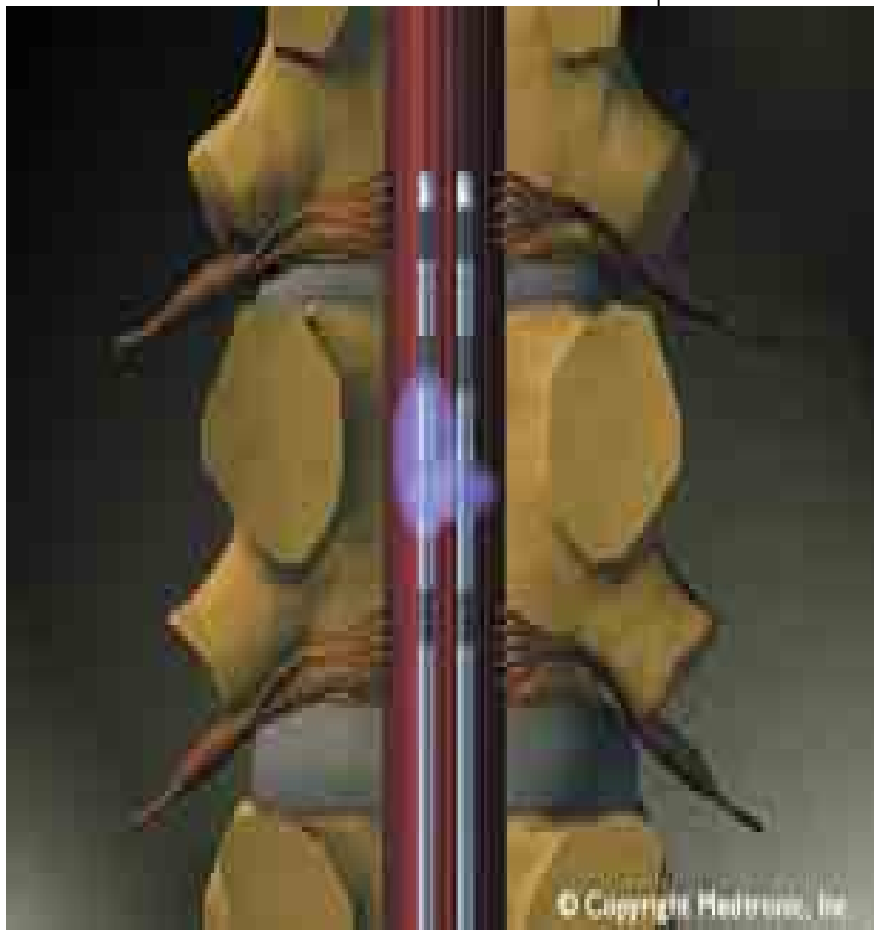
- Assessed mirror visual feedback (MVF) to test the hypothesis that incongruence between motor output and sensory input produces CRPS 1
- Method : Eight subjects were studies over 6 weeks with assessments including 2 controls
- Results : MVF in **early** CRPS (≤ 8 weeks) had an immediate analgesic effect and reduction of stiffness in intermediate disease (≤ 1yr) .No change observed in chronic cases
- Conclusion : in early CRPS (type 1), visual input from a moving unaffected limb re-establishes the pain-free relationship between sensory feedback and motor execution. Trophic changes in chronic cases precludes the benefit due to lacking of neural plasticity.

Graded motor imagery for pathologic pain an RCT

G. Lorimar Moseley, Neurology 2006

- Methods : Fifty-one patients with phantom limb pain or CRPS1 were randomly allocated to motor imagery, consisting of 2 weeks each of limb laterality recognition , imagined movements, and mirror movements, or to receive physical therapy and ongoing medical care
- Result : There was a main statistical effect of treatment group, but not diagnostic group, on pain and function.
- **Mean decrease** in pain between pre- and post –treatment (100mm visual analogue scale) was **23.4mm** (CI 16.2 to 30.4) for the motor imagery group vs. 10.5 mm (1.9 to 19.2 CI) for the control group. Gains were maintained at 6-month follow-up with -32.1 vs. -11.6 mm in VAS in the MIP compared to control.
- Improvement of function was similar and the gains maintained at 6 months
- Conclusion: Motor Imagery reduces pain.


Electrodes
Lead wire
Extension
Pulse generator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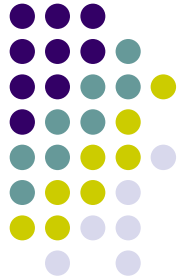
Spinal cord stimulation been sympathetically maintained complex regional pain syndrome C R P S 1



- Long-term effect of S C S was studied by Henning C on pain and functional disability was compared
- Pain intensity in 45 minutes of S C S free interval was compared with under S C S treatment
- On SCS the ***pain score reduced from 10 to 0-2*** on the 10 cm VAS .During in-activation. Pain recurs at 8 VAS
- Of the follow-up period of 35.6 months 12/16 with affected limb show increase in grip strength from 0 to 0.35 comparing 0.9 of the unaffected side side.
- 8/10 w lower limb weakness resumed walking with crutches. pain medication significantly reduced

  - Euro J. Pain 9(2005)363-373

Spinal cord stimulation in patients with chronic reflex sympathetic dystrophy

A Kemler, New England Journal of Medicine , 2000 Vol 343, Iss 6

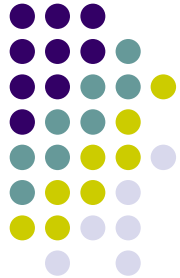
- Methods : randomized trial , thirty-six patients were assigned to received treatment with spinal cord stimulation plus physical therapy, and 18 were assigned to receive physical therapy alone.
- Results : in an intention-to-treat analysis, the group assigned to receive spinal cord stimulation plus physical therapy had a mean ***reduction of 2.4cm in VAS*** by six months compared to the group assigned to received physical therapy alone of 0.2 cm (P <0.001)
- There were no remarkable clinical improvement in functional status. The health-related quality of life improved only in patients who underwent implantation of a spinal cord stimulator.
- Conclusion: in selected patients w chronic RSD, SCS improves HRQOL and reduces pain
- (Patients has mean duration of Dx 34-40months.)

Impact of spinal cord stimulation on sensory characteristics in complex Regional Pain Syndrome Type I

Kemler, Anesthesiology V95, No. 1, July 2001

- Methods : Fifty-four chronic CRPS type I patients were randomized to receive both SCS and physical therapy (SCS+PT; n=36), or to receive only physical therapy (PT; n=18)
- Results : SCS showed no significant change on detection thresholds for warmth and cold or on pain thresholds for any sensation.
- The pressure detection threshold initially increased after SCS, but after 3 months, returned to baseline . Mechanical hyperalgesia, both dynamic and static was reduced slightly with SCS.
- Conclusions : SCS has previously been shown to cause a significant pain reduction in CRPS type I, the treatment has ***no long-term effect on detection thresholds for pain***, pressure, warmth, or cold. The treatment seems to have only minimal influence on mechanical hyperalgesia.

Spinal cord stimulation for complex we know pain syndrome: a systematic review and cost effectiveness analysis

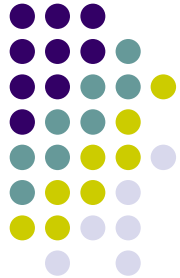


- Taylor have done a systematic review and meta-regression analysis
- 25 case series and one RCT and one cost effectiveness study was included
- S C S therapy led to a reduction in pain intensity at 24 months of FU (***mean change of –2 in the VAS***).
- 67% of type 1 and II C R P S patients implanted with SCS reported pain relief for at least 50% over a median follow up of 33 months.
- A lifetime cost saving was noted with the mean cost of quality adjusted life year QALY at 12 months follow-up being U.S. dollar $ 23480.

  - European Journal of pain 10(2006)91-101

Spinal cord stimulation for chronic pain

The Cochrane Database of Systematic Reviews
Mails Gagnon Vol 2, 2008



- Objective : to assess the efficacy and effectiveness of spinal cord stimulation in relieving certain kinds of pain as well as complications and adverse effects of this procedure

- Main results : Only 2 RCTS (***81 patients*** in total) met the inclusion criteria. One trial included patients with complex regional CRPS I and other patients with Failed back surgery syndrome. The FU period varied from 6 to 12 months meta analysis was not undertaken because of small no. of patients.

- Conclusion : ***limited evidence in favour of SCS***, more trials are needed to confirm whether SCS is an effective treatment for management of chronic pain

Subanesthetic Ketamine infusion therapy Correll , Pain Medicine 5(3); 263-75, 2004 Sept

- a retrospective analysis of novel approach
- Methods : case notes of 33 patients whose CRPS pain was treated by the inpatient administration of a continuous subanaesthetic intravenous infusion of Ketamine were reviewed.
- Result :
  - total 33 patients with diagnoses of CRPS, 12 of 33 patients received a second course of therapy, initial course of therapy was impressive, pain relief in 25(76%) partial relief in six (18%).
  - 54% of 33 individuals remained pain free for >3 months and 31% reminded pain free for >6 m. After the second infusion, 58% of 12 patients experience d relief for >6 months. After the second infusion, 58% of 12 patients experience relief for > 1 yr.
  - Hallucinations occurred in 6 patients, Less frequent side effects also included lightheadedness, dizziness and nausea, 4 patients has alteration in hepatic enzyme profile
- Conclusion : limited subanaesthetic inpatient infusions of Ketamine may offer a promising therapeutic option in the treatment.

Epidural clonidine treatment for refractory reflex sympathetic dystrophy

Rauck Anesthesiology , 79(6):1163-9

26 patients with severe chronic pain consistent with RSD were studies in a randomized, blinded, placebo-controlled design.

Cervical or lumbar epidural catheters were inserted for patients with upper or lower extremity RSD, in random order on 3 consecutive days, epidural injection of clonidine, 300 or 700 mcg, or placebo.

- Results : Clonidine, caused pain relief, sedation, and decreased blood pressure and heart rate after bolus epidural injection. The smaller dose (300 micrograms), produced pain relief and decrease in blood pressure with less sedation.
- 19 of this group of patients was infused on a mean rate of 32 mcg/hr for 43 days
- Conclusion : extensive analgesia may be obtained by epidural administration.

Can Vitamin C Prevent Complex Regional Pain Syndrome in Patients with Wrist Fractures?

A multicenter Dose-Response RCT

J Bone Joint Surg AM , P.E . Eollinger , 2007;89-1424-31

- Results : three hundred an seventeen patients with 328 fractures were randomized to receive vitamin C, and 99 patients with factures were randomized to receive a placebo.
- The prevalence of complex regional pain syndrome was 2.4% (eight of 328) in the vitamin C group and 10.1% (ten of 99) in the placebo group (p=0.002); all of the patients were elderly women.
- Analysis of the different doses of vitamin C showed that the prevalence of complex regional pain syndrome was 4.2% in the 200mg group (relative risk 0.41);1.8% in the 500mg group RR 0.17 and RR 0.17 in the 1500mg gp).
- Early cast-related complaints predicted the development of complex regional pain syndrome with relative risk 5.4 (CI 2.1-13.4)
- Conclusions : Vitamin reduces the prevalence of complex regional pain syndrome after wrist fractures. A daily dose of 500mg for fifty days is recommended.

Table 1 This table shows symptom-oriented treatment options for posttraumatic CRPS

1. All patients should receive physical therapy and symptomatic therapy for neuropathic pain Antineuropathic pain therapy should be selected according to pain characteristics and concomitant symptoms (sleeplessness, fears, secondary depression). Best evidence exists for TCA and Ca^{2+} channel blockers. If side effects are unbearable, but the drugs work: serotonin – noradrenalin re-uptake inhibitors are worth trying
2. Patients in an acute stage with edema, increased skin temperature systemic steroids + local DMSO
3. Repeated sympathetic blocks should be performed in all patients under suspicion of SMP – primary cold CRPS, cold allodynia, positive effect of single sympathetic block
4. In severe chronic stages Spinal cord stimulation

Minimally Invasive Intervention

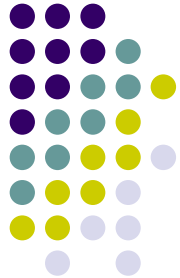
-Sympathetic, IV regional, and somatic nerve blocks
-Patients with a sympathetic component to their pain (SMP) should receive nerve blocks
-For patients without SMP, a somatic block or epidural infusion may be indicated to optimize for PT

More Invasive Intervention

-Tunneled epidural catheters
-Neuroaugmentation
-Spinal cord stimulation
-Intrathecal drug delivery

- **Stanton-Hicks M et al. Pain Practice. 2002;2:1-16**.

- Future development in research of CRPS limited by:--
- Diagnostic Criteria loosely followed in service centers and studies
- Heterogeneous patient group
- Discrepancies between symptom severity and imaging,Ix findings precluded accurate staging of disease severity
- Little truly blinded RCT,placebo effect, spontaneous recovery not eliminated
- Intervene by litigation and compensation issues



- Thank you