Case Series

Jigsaw puzzle: A case series on chronic pain condition

Bineesh Balakrishnan

Consultant in Physical Medicine and Rehabilitation, Hamsa Rehabilitation, Chennai

1. Case Presentation

We shall discuss the chronic pain complaints of two patients with CVA. Let's then know more about this pain entity, its treatment & rehabilitation. Let's put the pieces of the jigsaw puzzle together.

Case 1

A 54-year-old male with a diagnosed CVA Right Hemiplegia (S/P Thrombolysis) and Systemic Hypertension complained of severe chronic pain on the Right Wrist & Hand. This complaint was noted 7 months' post insult. On examination there was local warmth, weakness & skin changes.

Case 2

A 64-year-old female with the full diagnosis of CVA Right Monoplegia, Ischemic Cardiomyopathy, Systemic Hypertension, Type 2 DM & H/o Ca. Endometrium & Breast (S/P MRM, Hysterectomy & Chemo radiotherapy), had severe pain on the Left Wrist & Hand. She was diagnosed around 3 months after the CVA. Again local warmth, weakness & skin changes were noted.

2.Negative findings

In both these cases negative clinical findings have a lot of significance. They are as below:

- There was no obvious history of trauma
- No features of local infection were present
- No features suggestive of inflammatory pathologies were noted
- ESR, TLC, CRP, S. Procalcitonin (other parameters) were within normal limits
- Peripheral pulses were palpable in the involved area

So, here we are dealing with a chronic pain pathology which is a diagnosis of exclusion. Some of you must have already latched on to the diagnosis.

Citation: Bineesh Balakrishnan Jigsaw puzzle: A case series on chronic pain condition. Kauverian Med J., 2025;2(8):1-6.

Academic Editor: Dr. Venkita S. Suresh

ISSN: 2584-1572 (Online)

Copyright: © 2025 by the authors. Submitted for possible open access publication under the terms and conditions.

3. The diagnosis

We're dealing with a syndrome - CRPS i.e, Complex Regional Pain Syndrome. The International Association for the Study of Pain (IASP) defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage". Pain can be acute or chronic. Chronic pain has the following features:

- It lasts 3 months or longer
- Signs of Autonomic Nervous System response may be absent
- Because of the persistent pain the patient may be anxious, depressed or withdrawn

A 2013 Global Burden of Disease study found chronic pain (followed by major depressive disorder) to have the highest "years lived with disability" across multiple countries[1].

4. Stages of Pain Perception

There are generally three main stages in the perception of pain. The first stage is pain sensitivity, followed by the second stage where the signals are transmitted from the periphery to the dorsal horn (DH), which is located in the spinal cord via the peripheral nervous system (PNS). Lastly, the third stage is to perform the transmission of the signals to the higher brain via the central nervous system (CNS). Typically, there are two routes for signal transmissions to be conducted: ascending and descending pathways. The pathway that goes upward carrying sensory information from the body via the spinal cord towards the brain is defined as the ascending pathway, whereas the nerves that goes downward from the brain to the reflex organs via the spinal cord is known as the descending pathway[2].

5. Pain Mechanism, Peripheral & Central Sensitization

Fundamentally, the basic pain mechanism undergoes three events—transduction, transmission and modulation when there is a presence of noxious stimuli. For instance, transduction occurs along the nociceptive pathway following such order: (1) stimulus events are converted to chemical tissue events; (2) chemical tissue and synaptic cleft events are then changed into electrical events in the neurons; and (3) electrical events in the neurons are transduced as chemical events at the synapses. After the completion of transduction, the following mechanism would be transmission. It takes place by transmitting the electrical events along the neuronal pathways, while neurotransmitters in the synaptic cleft transmit information from a post-synaptic terminal of one cell to a pre-synaptic terminal of another. Meanwhile, the modulation event takes place at all level of nociceptive pathways through the primary afferent neuron, DH and higher brain center by up- or down-regulation. All these lead to one end result, and the pathway of pain has been initiated and completed, thus allowing us to feel the painful sensation triggered by the stimulus[2].

5.1 Peripheral Sensitisation

C fibers and Aδ receptors undergo changes in response to tissue injury such as inflammation, ischemia, and compression. These changes are marked at the peripheral terminals by the release of chemical mediators from damaged and inflammatory cells. The so-called inflammatory soup, rich in analgesic substances, causes a lowering of threshold for activation and subsequent evoked pain. Algogenic substances also activate second-messenger

systems, which induce gene expression in the cell. Excitatory amino acids and neuropeptides (substance P, CGRP, and neurokinins) are released by peripheral and central nociceptive C fibers, inducing neurogenic inflammation. Neurogenic inflammation involves retrograde release of algogenic substances, which in turn excites other nearby nociceptors, creating local feed-forward loops of sensitization and activation[1].

5.2 Central Sensitisation

The term central sensitization describes a complex set of activation dependent posttranslational changes occurring at the dorsal horn, brainstem, and higher cerebral sites. This results in an increase in calcium influx (and efflux from cytoplasmic organelles), contributing to potentiation of the cell by activation of calcium-dependent enzyme protein kinases (e.g., protein kinase C, cyclic adenosine monophosphate, and tyrosine receptor kinase). Posttranslational changes also include phosphorylation of NMDA and AMPA receptors, activation of second messengers such as nitric oxide, and central prostaglandin production[1]. Central sensitisation is responsible for features of hyperalgesia & allodynia seen in CRPS.

6. The Diagnostic Criteria

The diagnostic criteria for diagnosing CRPS is the Budapest criteria

A. Continuing pain, disproportionate to any inciting event.

B. Must report at least one symptom in three of the four categories

1. Sensory: hyperalgesia and/or allodynia
2. Vasomotor: temperature asymmetry and/or skin color changes and/or skin color asymmetry.
3. Sudomotor/edema: edema and/or sweating changes and/or sweating asymmetry
4. Motor/trophic: decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nails, or skin)

C. Must display at least one sign at time of evaluation in two or more of the following four categories.

1. Sensory: evidence of hyperalgesia (to pinprick) and/or allodynia (to light touch and/or deep somatic pressure and/or joint movement)
2. Vasomotor: evidence of temperature asymmetry and/or skin color changes and/or asymmetry
3. Sudomotor/edema: evidence of edema and/or sweating changes and/or sweating asymmetry
4. Motor/trophic: evidence of decreased range of motion and/or motor dysfunction (weakness, tremor, dystonia) and/or trophic changes (hair, nails, skin)

D. There is no other diagnosis that better explains the signs & symptoms

7. Differential Diagnoses

From the criteria it is obvious that this is a diagnosis of exclusion. This makes it quintessential to rule out other conditions. The important differential diagnoses include

1. Compartment syndrome
2. Non-union of a fracture
3. Traumatic vasospasm
4. Regional vascular disease- Raynaud's phenomenon, Buerger's disease
5. Cellulitis
6. Neuropathy
7. Regional autoimmune disease

CRPS is a clinical diagnosis. Expensive investigations are usually not warranted.

8. Types of CRPS & More

There are 2 types of CRPS

CRPS I - which is associated with trauma, immobilization, visceral disease & in neurological pathology.

CRPS II - in this there is physical & electrodiagnostic evidence of peripheral nerve damage. Initials symptoms start in one peripheral nerve distribution & then spread. Median & sciatic nerves are commonly affected.

The incidence of CRPS is 5.5 to 26.2 per 100,000 person years at risk.

Some of the preventive measures include- passive mobilization, positioning & using low dose Vitamin C (200mg/day) after a wrist fracture. CRPS is highly disabling and it is better to have a high index of suspicion The first Monday in November is dedicated to bringing awareness to complex regional pain syndrome with color the world orange day[3]

9. Treatment of this Condition

The 4 pillars of treatment of CRPS can be referred to as 4 Ps:

Patient education and information

Physical therapy (ROM exercises, Strengthening exercises, Contrast baths, Low frequency TENS, etc.)

Pain management (drugs and interventions)

Psychological therapy[4]

Some of the commonly used medications for managing CRPS & thieir indications are listed below:

1. In patients with significant allodynia & hyperalgesia drugs like Pregabalin, Gabapentin, & Oxcarbamazepine are used.

2. If the pain is excruciating or intolerable then opioids with or without nerve blocks can be used. If the pain is persistent inspite of high doses of opioids, then Experimental treatment options like Spinal cord stimulation can be tried.

3. If there is inflammation, swelling & edema, systemic or targeted Steroids, NSAIDs & if needed Immunomodulators can be tried.

4. If there is depression, anxiety & insomnia we can consider sedatives, analgesic anstidepressants/anxiolytics & psychotherapy can be used.

5. For significant osteopenia, immobility & trophic changes calcitonin & bisphosphonates can be used.

6. If there are severe vasomotor changes then Calcium channel blockers, sympatholytics &/or blocks could be used.

7. For mild to moderate pain analgesics or blocks could be used[5].

10. Functional Restoration Algorithm

- **Step 1** - Reactivation, Contrast baths, Desensitisation & Exposure therapy
- **Step 2** - Flexibility, Edema control, Isometric strengthening, Correction of postural abnormalities, Diagnosis & treatment of Myofascial pain
- (If you are unable to pass or progress to the next step then medications or stronger medications must be used. Psychotherapy or stronger Psychotherapeutic interventions must be used to help to progress to the next step)
- **Step 3** - Gentle ROM, Stress loading, Isotonic strengthening, General aerobic conditioning, Posture normalization & balanced use
- **Step 4** - Ergonomics, Movement therapies (Yoga, Tai Chi), Normalization of use, Functional/vocational rehabilitation

Now we're done with the jigsaw puzzle. Hope you enjoyed learning about this entity.

11. Bibliography

[1] Braddom's Physical Medicine and Rehabilitation, 6th Edition, David X. Cifu MD

[2] https://pmc.ncbi.nlm.nih.gov/articles/PMC6121522/

[3] https://www.nationaldaycalendar.com/international/color-the-world-orange-day-first-monday-in-november

[4] https://resources.wfsahq.org/atotw/complex-regional-pain-syndrome/

[5] Bonica's Management of Pain, 5th Edition, Jane C. Ballantyne et al.