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A Novel Treatment for Type 2 Complex Regional Pain Syndrome Caused by Median and Ulnar Compressive Neuropathies: A Case Report

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Background

- Complex regional pain syndrome (CRPS) is characterized by spontaneous or stimulus-induced pain that is disproportional to the inciting event and accompanied by a myriad of autonomic and motor disturbances in highly variable combinations [1].
- CRPS has been subdivided into type I and type II. CRPS I (also called reflex sympathetic dystrophy) occurs without a direct nerve injury; while CRPS II occurs after damage to a peripheral nerve (also called causalgia [1].
- The Budapest Criteria for CRPS is validated metric for the clinical diagnosis of CRPS [2].
- Triple phase bone scan, x-ray findings, quantitative sudomotor axon reflex test (QSART), electrodiagnostic studies, and Budapest Criteria can help in establishing a diagnosis of CRPS [3]. Response to a stellate ganglion block is the gold standard for diagnosis.

Budapest Criteria for CRPS

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 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

History of Present Illness

- A 61 year-old-female presented to our clinic with left arm pain.
- She had a history of left ulnar nerve neurolysis and anterior translocation 6 years prior for severe ulnar nerve compression confirmed by electrodiagnostic studies.
- Shortly after surgery, she developed left upper extremity numbness, allodynia, and dysesthesias in the ulnar and median nerve distributions in her forearm and entire hand.

Physical Exam

- Her left hand and forearm were noted to be swollen with a mottled appearance. Left grip strength and 5th digit abduction was 4/5. Allodynia was noted in the median and ulnar nerve distributions distal to the left elbow.

Work-Up & Diagnosis

- Electrodiagnostic study was ordered when her symptoms first presented showing resolution of previously described left ulnar mononeuropathy after ulnar nerve translocation preformed 1 year.
- QSART showed asymmetries in skin temperature and resting sweat output when compared to the non-affected limb consistent with sudomotor changes.
- Diagnostic ultrasound of the transpositioned ulnar nerve showed circumference changes from 8.82 mm2 to 16.62 mm2 with large fascicle size indicative of structural changes to the transpositioned ulnar nerve.
- Given structural changes which were seen within the left transpositioned ulnar with no change to nerve physiology on electrodiagnostic studies, consistency of the Budapest Criteria, and sudomotor changes on QSART the diagnosis of CRPS type 2 was established.

Treatment

- She failed conservative treatment including medications prescribed such as gabapentin, amitriptyline, duloxetine, topiramate, and various narcotics. She underwent two Stellate ganglion blocks which provided relief for less than a day.
- In an attempt to avoid escalating to a spinal cord stimulator, we performed hydrodissection of the left transpositioned ulnar and left median nerves under ultrasound guidance.

Intervention

- Ultrasound guidance was used to localize the left transpositioned ulnar and median nerves prior to hydrodissection. Injectate consisted of 5cc of 1% lidocaine, 1cc of 40mg/ml methylprednisolone, and 4cc of normal saline, totaling 10cc for each hydrodissection.
- Image 1: Ultrasound transducer was placed in a transverse plane to localize the brachial artery directly medial to the median nerve. Transducer was moved medially to visualize the transpositioned ulnar nerve sitting within the superficial mass of the pronator muscle belly. In-plan needle approach was used from a lateral to medial direction.
- Image 2: Ultrasound transducer was placed in a transverse plane to visualize the median nerve. In-plan needle approach was used from a lateral to medial direction. The needle was advanced just superficial and deep to the median nerve making sure to avoid the brachial artery. 50% of the injectate was placed at each location.

Outcomes

- Post-procedurally, hypersensitivity and pain resolved completely. Relief lasted 12 weeks. The procedure has been repeated multiple times over the last 3 years with the complete resolution of symptoms ranging from 3 to 12 weeks post-procedure.

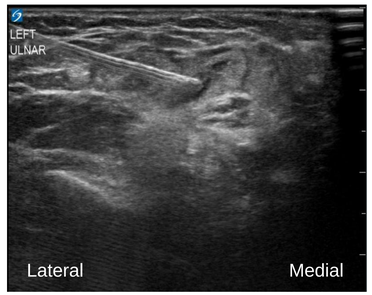

Image 1: Ultrasound guided hydrodissection of the left transpositioned ulnar nerve.

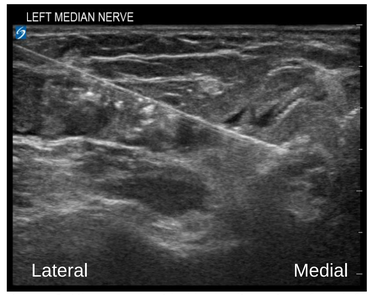

Image 2: Ultrasound guided hydrodissection of the left median nerve.

Discussion

- Differential diagnosis for presentations similar to CRPS include neuropathies (peripheral or central nervous system injuries, endocrinologic/metabolic, or post-herpetic causes), thoracic outlet syndrome, vascular disorders (Raynaud's disease, arterial insufficiency, phlebothrombosis, etc.), compartment syndrome, inflammatory arthropathies, and somatoform or fictitious disorders [3].
- Treatment for CRPS includes medication management to control pain symptoms & therapy to target joint range-of-motion, edema, and desensitization. These have limited evidence and are often used in a trial-and-error basis [1].
- Sympathetic neuromodulation through sympathetic ganglion blockade or spinal cord stimulator have shown to be efficacious in treating pain and improving quality of life [3]. Our patient had fleeting relief with stellate ganglion block. Due to associated costs and risk, spinal cord stimulators are reserved for individuals who have failed conservative therapy.
- This is the first case, to our knowledge, of using ultrasound-guided median and ulnar nerve hydrodissection to treat type 2 CRPS secondary to median and ulnar neuropathies.

Conclusion

- This novel procedure has the potential to be a viable treatment option in those with CRPS type 2 who have failed conventional treatments. Further studies are needed to assure it is a feasible and efficacious treatment option in this population.

References

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